201-15593B1

I U C L I D

D a t a s e t

Existing Chemical	Substance ID: 79-09-4
CAS No.	79-09-4
EINECS Name	propionic acid
EINECS No.	201-176-3
Molecular Formula	C3H6O2

Dataset created by: EUROPEAN COMMISSION - European Chemicals Bureau

This dossier is a compilation based on data reported by the European Chemicals Industry following 'Council Regulation (EEC) No. 793/93 on the Evaluation and Control of the Risks of Existing Substances'. All (non-confidential) information from the single datasets, submitted in the IUCLID/HEDSET format by individual companies, was integrated to create this document.

The data have not undergone any evaluation by the European Commission.

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1.0.1 OECD and Company Information

Name: BASF AG
Street: Karl–Bosch–Str
Town: 67056 Ludwigshafen
Country: Germany

Name: BP Chemicals Ltd.
Street: 76, Buckingham Palace Road
Town: SW1 WOSU London
Country: United Kingdom

Name: Celanese, N.V.
Street: Oude Maasweg 3197 KJ Botlek
Town: Rotterdam
Country: Netherlands

Name: Eastman Chemical (Deutschland) GmbH
Street: Charlottenstrasse 61
Town: D–51149 Koln
Country: Germany
Phone: +(49) (02203) 1705–0
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Name: Eastman Chemical AG
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Name: Neste Oxo AB
Town: 44484 Stenungsund
Country: Sweden
Phone: +46 303 85600
Telefax: +46 303 856 07
Telex: 27052 nestox S

Name: NEUBER GES.M.B.H.
Street: BRÜCKENGASSE 1
Town: 1060 WIEN
Country: Austria
Phone: 0222/599950
Telefax: 0222/5970200

1.0.2 Location of Production Site

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1.0.3 Identity of Recipients

-

1.1 General Substance Information

Substance type: organic
Physical status: liquid

1.1.1 Spectra

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1.2 Synonyms

Adofeed
Source: BASF AG Ludwigshafen

Antischim B
Source: BASF AG Ludwigshafen

Carboxyethane
Source: BASF AG Ludwigshafen

Ethanecarboxylic acid
Source: Celanese, N.V. Rotterdam
BASF AG Ludwigshafen

Ethylformic acid
Source: BASF AG Ludwigshafen

Luprosil
Source: BASF AG Ludwigshafen

Metacetonic acid
Source: BASF AG Ludwigshafen

Metacetonsäure, Methylessigsäure, Propansäure
Source: NEUBER GES.M.B.H. WIEN

Methylacetic acid
Source: Celanese, N.V. Rotterdam
BASF AG Ludwigshafen

MonoProp
Source: BASF AG Ludwigshafen

propanoic acid
Source: Celanese, N.V. Rotterdam
Eastman Chemical AG Zug
Eastman Chemical (Deutschland) GmbH Koln

Propanoic acid (9CI)
Source: BASF AG Ludwigshafen

Propcorn
Source: BASF AG Ludwigshafen

Propionic acid (6CI, 8CI)
Source: BASF AG Ludwigshafen

Propionsaeure
Source: BASF AG Ludwigshafen

Propkorn
Source: BASF AG Ludwigshafen

Prozoin
Source: BASF AG Ludwigshafen

Pseudoacetic acid
Source: BASF AG Ludwigshafen

1.3 Impurities

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1.4 Additives

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1.5 Quantity

Quantity 100 000 - 500 000 tonnes

1.6.1 Labelling

Labelling: as in Directive 67/548/EEC
Symbols: C
Nota: B
D
Specific limits: yes
R-Phrases: (34) Causes burns
S-Phrases: (1/2) Keep locked up and out of reach of children
(23) Do not breathe ...
(36) Wear suitable protective clothing
(45) In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

1.6.2 Classification

Classification: as in Directive 67/548/EEC
Class of danger: corrosive
R-Phrases: (34) Causes burns

1.7 Use Pattern

Type: type
Category: Non dispersive use

Type: type
Category: Use in closed system

Type: type
Category: Wide dispersive use

Type: industrial
Category: Agricultural industry

Type: industrial
Category: Basic industry: basic chemicals

Type: industrial
Category: Chemical industry: used in synthesis

Type: industrial
Category: other: feed preservative

Type: industrial
Category: other

Type: use
Category: Food/foodstuff additives

Type: use
Category: Intermediates

Type: use
Category: other

1.7.1 Technology Production/Use

-

1.8 Occupational Exposure Limit Values

Type of limit: MAK (DE)
Limit value: 10 ml/m3
Short term expos.
Limit value: 20 ml/m3
Schedule: 5 minute(s)
Frequency: 8 times
Source: BASF AG Ludwigshafen

(1)

Type of limit: MAK (DE)
Limit value: 30 mg/m3
Source: BASF AG Ludwigshafen

(1)

Type of limit: OES (UK)
Limit value: 31 mg/m3
Remark: OES = 31 mg/m3, 8 hour TWA
Source: Eastman Chemical AG Zug
Eastman Chemical (Deutschland) GmbH Koln

(2)

Type of limit: OES (UK)
Limit value: 10 ml/m3
Short term expos.
Limit value: 15 ml/m3
Source: BP Chemicals Ltd. London

Type of limit: TLV (US)
Limit value: 30 mg/m3
Source: Celanese, N.V. Rotterdam

Type of limit: TLV (US)
Limit value: 31 mg/m3
Source: Eastman Chemical AG Zug
Eastman Chemical (Deutschland) GmbH Koln

(3)

Type of limit: TLV (US)
Limit value: 30 mg/m3
Source: BASF AG Ludwigshafen

(4)

Type of limit: TLV (US)
Limit value:
Remark: Limit value: 10 ppm
Source: BASF AG Ludwigshafen

(4)

Type of limit: TLV (US)
Limit value: 30 mg/m3
Source: BASF AG Ludwigshafen

(4)

1.9 Source of Exposure

Remark: The recommended method of disposal is by incineration under controlled conditions.
Source: Eastman Chemical AG Zug
Eastman Chemical (Deutschland) GmbH Koln

1.10.1 Recommendations/Precautionary Measures

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1.10.2 Emergency Measures

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1.11 Packaging

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1.12 Possib. of Rendering Subst. Harmless

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1.13 Statements Concerning Waste

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1.14.1 Water Pollution

Classified by: KBwS (DE)
Labelled by: KBwS (DE)
Class of danger: 1 (weakly water polluting)
Source: BASF AG Ludwigshafen

Classified by: KBwS (DE)
Labelled by:
Class of danger: 1 (weakly water polluting)
Source: BASF AG Ludwigshafen

1.14.2 Major Accident Hazards

Legislation: Stoerfallverordnung (DE)
Substance listed: no
Source: BASF AG Ludwigshafen

(5)

1.14.3 Air Pollution

Classified by: TA-Luft (DE)
Labelled by: TA-Luft (DE)
Number: 3.1.7 (organic substances)
Class of danger: II
Source: BASF AG Ludwigshafen

1.15 Additional Remarks

Remark: Propionic acid is shipped either in bulk or in polyethylene drums. The bulk shipments are in tank trucks, rail tank cars, or rail tank containers. Our warehouses check that the transporters have the necessary papers and equipment available in case of an emergency.
Source: Eastman Chemical AG Zug
Eastman Chemical (Deutschland) GmbH Koln

1.16 Last Literature Search

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1.17 Reviews

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1.18 Listings e.g. Chemical Inventories

-

2.1 Melting Point

Value: ca. -20 degree C
Source: BASF AG Ludwigshafen
(6)

Value: = 22.4 degree C
Source: BASF AG Ludwigshafen
(7)

2.2 Boiling Point

Value: = 140.7 - 141.6 degree C
Source: BASF AG Ludwigshafen
(6)

2.3 Density

Type: density
Value: = .992 g/cm3 at 20 degree C
Source: BASF AG Ludwigshafen
(6)

2.3.1 Granulometry

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2.4 Vapour Pressure

Value: = 5 hPa at 20 degree C
Source: BASF AG Ludwigshafen
(6)

2.5 Partition Coefficient

log Pow: = .25
Method:
Year:
Source: BASF AG Ludwigshafen
(6) (8)

log Pow: = .278
Method: other (calculated): Inkrementenmethode von Rekker mit Computerprogramm der Firma CompuDrug Ltd.
Year:
Source: BASF AG Ludwigshafen
(9)

log Pow: = .33
Method:
Year:
Source: BASF AG Ludwigshafen
(10)

2.6.1 Water Solubility

Value: at 20 degree C
Qualitative: miscible
pH: 2.5 at 100 g/l and 20 degree C
Source: BASF AG Ludwigshafen
(6)

2.6.2 Surface Tension

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2.7 Flash Point

Value: = 50 degree C
Type: closed cup
Method: other: DIN 51 755
Year:
Source: BASF AG Ludwigshafen
(6)

Value: = 52.3 degree C
Type: other: Pensky-Martens closed cup
Method:
Year:
GLP: yes
Source: BASF AG Ludwigshafen
(11)

Value: = 54 degree C
Type: other: Tag open cup
Method: other: ASTM D56
Year:
GLP: no
Source: BASF AG Ludwigshafen
(12)

2.8 Auto Flammability

Value: = 466 degree C
Method: other: ASTM D2155
GLP: no
Source: BASF AG Ludwigshafen
(12)

Value: = 485 degree C
Method: other: DIN 51 794
Source: BASF AG Ludwigshafen

(6)

2.9 Flammability

Result:
Remark:
Type: lower flammable limit
Value: 3.04 % at 64 dgree C
Method: ASTM E681
GLP: no

type: upper flammable limit
Value: 14.9 % at 118 degree C
Method: ASTM E681
GLP: no

Type: lower temperature limit
Value: 48 degree C
Method: ASTM E1232
GLP: no

Type: upper temperature limit
Value: 81 degree C
Method: ASTM E1232
GLP: no

Source: BASF AG Ludwigshafen

(12)

2.10 Explosive Properties

Result:
Remark: Explosionsgrenzen in Luft: 2,1-12,0 Vol.%
Source: BASF AG Ludwigshafen

(6)

Result:
Remark:
Type: Differential Thermal Analysis
Value: no exothermiv activity to 138 degree C
Method: ASTM E537
GLP: no

Source: BASF AG Ludwigshafen

(13)

Result:
Remark:
Type: Differential Thermal Analysis
Value: no exothermiv activity to 138 degree C
Method: ASTM E537
GLP: no

Source: BASF AG Ludwigshafen

(13)

2.11 Oxidizing Properties

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2.12 Additional Remarks

Remark: Gefaehrliche Reaktionen: Exotherme Reaktion mit starken Basen.
Source: BASF AG Ludwigshafen

(6)

Remark: Viscosity
Type: Average Viscosity (n=3)
Value: less than 5 centipoises at 25 degree C +/–1 degree C
Method: Modification of rotational viscometer method described in OECD, Section 4, No. 114

Corrosion Characteristics
Method: Modifications of methods described in ASTM G31–72
Comment: The average corrosion rate of zinc foil when exposed to aqueous suspensions of test material for 7 days was determined to be 1mm/year, with a standard deviation of 0.0. There was no significant change in temperature (> 2 degree C), evolution of gases, noxious fumes, flames, or splattering observed when aqueous supsensions of test material were placed in contact witg solid reactant (zinc foil).
Source: BASF AG Ludwigshafen

(14)

Remark: Combustible, otherwise stable.
Source: BASF AG Ludwigshafen

(15)

Remark: Viscosity
Type: Average Viscosity (n=3)
Value: less than 5 centipoises at 25 degree C +/–1 degree C
Method: Modification of rotational viscometer method described in OECD, Section 4, No. 114

Corrosion Characteristics
Method: Modifications of methods described in ASTM G31–72
Comment: The average corrosion rate of zinc foil when exposed to aqueous suspensions of test material for 7 days was determined to be 1mm/year, with a standard deviation of 0.0. There was no significant change in temperature (> 2 degree C), evolution of gases, noxious fumes, flames, or splattering observed when aqueous supsensions of test material were placed in contact witg solid reactant (zinc foil).
Source: BASF AG Ludwigshafen

(14)

Remark: Combustible, otherwise stable.
Source: BASF AG Ludwigshafen

(15)

3.1.1 Photodegradation

Type: air
INDIRECT PHOTOLYSIS
Sensitizer: OH
Conc. of sens.: 500000 molecule/cm3
Degradation: = 50 % after 13.2 day
Method:
Year: **GLP:**
Test substance:
Remark: Rate Constant: 1.6 (+/- 0.5)*10^-12, bzw. 1.22 (+/-0.12)* 10^-12 cm^3/molecule*sec bei 298 K
Source: BASF AG Ludwigshafen
(16) (17)

Type: water
INDIRECT PHOTOLYSIS
Sensitizer: OH
Method:
Year: **GLP:**
Test substance:
Remark: Rate Constant: 0.79*10^9 l/mol*sec (rel. to ethanol: k= 1.85*10^9 l/mol*sec)
Source: BASF AG Ludwigshafen
(18)

Type: water
INDIRECT PHOTOLYSIS
Sensitizer: OH
Degradation: = 50 % after 4.7 year
Method: other (calculated)
Year: **GLP:**
Test substance:
Remark: Rate Constant: 0.47*10^9 l/mol*sec
Source: BASF AG Ludwigshafen
Test condition: room temperature; literature value for OH-radical concentration in water: 1*10^-17 mol/l; pH 9
(19)

3.1.2 Stability in Water

Type:
Method: other
Year: **GLP:**
Test substance:
Remark: no data are available
Source: BASF AG Ludwigshafen

3.1.3 Stability in Soil

Type: other **Radiolabel:**
Concentration:
Cation exch. capac.
Microbial biomass:
Method:
Year: **GLP:**
Test substance:
Remark: no data are available
Source: BASF AG Ludwigshafen

3.2 Monitoring Data (Environment)

Type of measurement: other
Medium: other: water
Remark: Propionic acid was detected in (with GC): Ohio 0.01-0.7 ug/l; Little Miami 0.4-0.5 ug/l; Tannes Creek 0.8 ug/l.
Source: BASF AG Ludwigshafen

(20)

Type of measurement: other
Medium: air
Remark: Propionic acid was found in Delft, Terschelling and Vlaadingen (Netherlands) in air (with GC): 0.15 ppm (mean); 2.0 ppm (max.)
Source: BASF AG Ludwigshafen

(21)

3.3.1 Transport between Environmental Compartments

Type: volatility
Media:
Method:
Year:
Remark: Henry's Law Constant of 4.15*10^-7 atm*m^3/mol at 25 deg C
Source: BASF AG Ludwigshafen

(22)

3.3.2 Distribution

Media: other
Method:
Year:
Remark: no data are available
Source: BASF AG Ludwigshafen

3.4 Mode of Degradation in Actual Use

Remark: no data are available
Source: BASF AG Ludwigshafen

3.5 Biodegradation

Type: aerobic
Inoculum:
Degradation: = 69.1 % after 5 day
Method: other: Sea Water Dilution Method (BOD of THOD)
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen
Test condition: Test concentration: 5 ppm

(23)

Type: aerobic
Inoculum:
Degradation: = 78.1 % after 5 day
Method: other: Standard Dilution Method (BOD of THOD)
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen
Test condition: Test concentration: 5 ppm

(23)

Type: aerobic
Inoculum: activated sludge
Concentration: 400 mg/l
Degradation: ca. 95 % after 10 day
Method: other: Standversuch (TOC)
Year: **GLP:**
Test substance:
Remark: Gut eliminierbar, biologisch abbaubar.
lag-Phase: 1 d; Beginn der Plateauphase: nach 3 d
Source: BASF AG Ludwigshafen

(24)

Type: aerobic
Inoculum: other: activated sludge, municipal
Concentration: 500 mg/l related to Test substance
Degradation: = 40.4 % after 24 hour(s)
Method: other: Warburg Test (Respirometer); BOD of THOD
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(25)

Type: anaerobic
Inoculum: other: enriched methane cultures
Degradation: = 100 %
Method: other: Hungate Serum Bottle Technique
Year: **GLP:**
Test substance:
Remark: 100% degradation after 2 d lag; removal rate 90 mg/l per day
Source: BASF AG Ludwigshafen
Test condition: 50 ml Inoculum; 100 mg acetate; 25 mg test compound (500 mg/l); 6 injections of test compound

(26)

3.6 BOD5, COD or BOD5/COD Ratio

Method: other: Biochemical Oxygen Demand Method 405.1, U.S.EPA (EPA-600/4-79-020, March, 1979)

C O D

Method: other: Chemical Oxygen Demand Method 410.1, U.S.EPA (EPA-600/4-79-020, March, 1979)
COD: = 1420 mg/g substance

Remark: THOD: 1.51 g oxygen/g; BOD5: 0.77 oxygen/g; BOD5: 0.92 oxygen/g; COD: 1.42 oxygen/g
Source: BASF AG Ludwigshafen

(27)

3.7 Bioaccumulation

Species: other
Exposure period:
Concentration:
BCF:
Elimination:
Method:
Year: **GLP:**
Test substance:
Remark: no data are available
Source: BASF AG Ludwigshafen

3.8 Additional Remarks

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AQUATIC ORGANISMS

4.1 Acute/Prolonged Toxicity to Fish

Type: static
Species: Leuciscus idus (Fish, fresh water)
Exposure period: 96 hour(s)
Unit: mg/l **Analytical monitoring:** no
NOEC: = 5000
LC0: = 5000
LC50: > 10000
LC100: > 10000
Method: other: Bestimmung der Wirkung von Wasserinhaltsstoffen auf Fische, DIN 38412 Teil 15
Year: 1982 **GLP:** no
Test substance: other TS
Remark: 10000mg/l: lethality 2/10 after 96H
5000mg/l: no lethality
No toxic symptoms detectable.
Source: BASF AG Ludwigshafen
Test substance: Lupronilsalz (Calciumpropionat)

(28)

Type: static
Species: Leuciscus idus (Fish, fresh water)
Exposure period: 96 hour(s)
Unit: mg/l **Analytical monitoring:** no
NOEC: = 5000
LC0: = 5000
LC50: > 10000
LC100: > 10000
Method: other: Bestimmung der Wirkung von Wasserinhaltsstoffen auf Fische, DIN 38412 Teil 15
Year: 1982 **GLP:** no
Test substance: other TS
Remark: 10000mg/l: lethality 2/10 after 96H
5000mg/l: no lethality
No toxic symptoms detectable.
Source: BASF AG Ludwigshafen
Test substance: Lupronilsalz (Calciumpropionat)

(29)

Type: static
Species: Pimephales promelas (Fish, fresh water)
Exposure period: 96 hour(s)
Unit: µg/l **Analytical monitoring:**
LC50: >= 1000
Method: other: see remarks
Year: **GLP:** no
Test substance: other TS
Remark: Highest concentration tested. pH adjusted upward.
Test method: Eastman Kodak Company, Health and Environment Laboratories Protocol according to Ewell, W.S, Gorsuch, J.W., Kringle, R.O, Robillard, K.A., and Spiegal, R.C. (Simultaneous Evaluation of the Acute Effects of Chemicals on Seven Species, Environ.Toxicol.Chem. 5,831-840, 1986). Similar to OECD Guideline 203.
Source: BASF AG Ludwigshafen
Test substance: Propionic acid

(30)

Type:
Species: Cyprinus carpio (Fish, fresh water)
Exposure period: 48 hour(s)
Unit: mg/l **Analytical monitoring:**
LC50: = 72
Method:
Year: **GLP:**
Test substance:
Remark: LC50 24h: 95mg/l.
Japanese article with abstract and figures in english.
Source: BASF AG Ludwigshafen

(31) (32)

Type:
Species: Lepomis macrochirus (Fish, fresh water)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:**
LC50: = 188
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(33) (34) (35)

Type:
Species: Lepomis macrochirus (Fish, fresh water)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:**
LC50: = 188
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(31) (36) (35)

Type:
Species: Lepomis macrochirus (Fish, fresh water)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:**
LC50: = 5000
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(35)

4.2 Acute Toxicity to Aquatic Invertebrates

Species: Daphnia magna (Crustacea)
Exposure period: 96 hour(s)
Unit: **Analytical monitoring:**
Method: other: Static test
Year: **GLP:**
Test substance:
Remark: EC50(96h)= 320 ul/l
Source: BASF AG Ludwigshafen
Test condition: pH adjusted upward
Test method: Eastman Kodak Company, Health and Environment Laboratories Protocol according to Ewell,W.S. et al., (Simultaneous Evaluation of the Acute Effects of Chemicals on Seven Species, Environ. Toxicol. Chem.5, 831-840, 1986

(27)

Species: Daphnia magna (Crustacea)
Exposure period: 24 hour(s)
Unit: mg/l **Analytical monitoring:**
TLm : = 130
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(37)

Species: Daphnia magna (Crustacea)
Exposure period: 48 hour(s)
Unit: mg/l **Analytical monitoring:**
TLm : = 50
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(38)

Species: Gammarus pulex (Crustacea)
Exposure period:
Unit: mg/l **Analytical monitoring:**
Method:
Year: **GLP:**
Test substance:
Remark: perturbation level =6000 mg/l.
Source: BASF AG Ludwigshafen
(37)

Species: other aquatic mollusc: Helisoma trivolvis
Exposure period: 96 hour(s)
Unit: **Analytical monitoring:**
Method: other: Static test
Year: **GLP:** no
Test substance:
Remark: EC50(96h) >1000 ul/l (highest concentration tested)
Source: BASF AG Ludwigshafen
Test condition: Test method: Eastman Kodak Company, Health and Environment Laboratories Protocol according to Ewell,W.S. et al., (Simultaneous Evaluation of the Acute Effects of Chemicals on Seven Species, Environ. Toxicol. Chem.5, 831-840, 1986
(27)

Species: other aquatic worm: Dugesia tigrina
Exposure period: 96 hour(s)
Unit: **Analytical monitoring:**
Method: other: Static test
Year: **GLP:** no
Test substance:
Remark: EC50(96h) >1000 ul/l (highest concentration tested)
Source: BASF AG Ludwigshafen
Test condition: Test method: Eastman Kodak Company, Health and Environment Laboratories Protocol according to Ewell,W.S. et al., (Simultaneous Evaluation of the Acute Effects of Chemicals on Seven Species, Environ. Toxicol. Chem.5, 831-840, 1986
(27)

4.3 Toxicity to Aquatic Plants e.g. Algae

Species: Chlorella pyrenoidosa (Algae)
Endpoint:
Exposure period:
Unit: mg/l **Analytical monitoring:**
toxisch : = 250
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen
(37)

Species: Scenedesmus subspicatus (Algae)
Endpoint:
Exposure period: 72 hour(s)
Unit: mg/l **Analytical monitoring:**
EC50: = 45.8
EC20 : = 33.5
Method: other: Scenedesmus-Zellvermehrungs-Hemmtest, DIN 38412 Teil 9, Bestimmung der Hemmwirkung von Wasserinhaltsstoffen auf Gruenalgen
Year: **GLP:**
Test substance:
Remark: EC90(72h)=62.3 mg/l.
Source: BASF AG Ludwigshafen

(39)

Species: Scenedesmus subspicatus (Algae)
Endpoint:
Exposure period: 96 hour(s)
Unit: mg/l **Analytical monitoring:**
EC50: = 43
EC20 : = 12
Method: other: Scenedesmus-Zellvermehrungs-Hemmtest, DIN 38412 Teil 9, Bestimmung der Hemmwirkung von Wasserinhaltsstoffen auf Gruenalgen
Year: **GLP:**
Test substance:
Remark: EC90(96h)=79 mg/l.
Source: BASF AG Ludwigshafen

(39)

4.4 Toxicity to Microorganisms e.g. Bacteria

Type:
Species: activated sludge
Exposure period:
Unit: **Analytical monitoring:**
Method:
Year: **GLP:**
Test substance:
Remark: Bei sachgemaesser Einleitung (Neutralisation) in adaptierte biologische Klaeranlagen sind keine Stoerungen der Abbauaktivitaet von Belebtschlamm zu erwarten.
Source: BASF AG Ludwigshafen

(40)

Type:
Species: Paramaecium caudatum (Protozoa)
Exposure period:
Unit: mg/l **Analytical monitoring:**
Method:
Year: **GLP:**
Test substance:
Remark: Perturbation level: 8000 mg/l
Source: BASF AG Ludwigshafen

(41)

Type:
Species: Pseudomonas putida (Bacteria)
Exposure period: 17 hour(s)
Unit: mg/l **Analytical monitoring:**
EC10: = 44.6
EC50: = 59.6
EC90 : = 74.5
Method: other: Pseudomonas–Zellvermehrungs–Hemmtest, DIN 38412 Teil 8, zum Gelbdruck verabschiedet, Bestimmung der Hemmwirkung von Wasserinhaltsstoffen auf Bakterien
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(39)

Type:
Species: Pseudomonas putida (Bacteria)
Exposure period:
Unit: mg/l **Analytical monitoring:**
TGK : = 200
Method: other: Zellvermehrungshemmtest
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(42)

Type:
Species: other protozoa: Vorticella campanula
Exposure period:
Unit: mg/l **Analytical monitoring:**
Method:
Year: **GLP:**
Test substance:
Remark: Perturbation level: 4000 mg/l
Source: BASF AG Ludwigshafen

(41)

4.5 Chronic Toxicity to Aquatic Organisms

4.5.1 Chronic Toxicity to Fish

Species: Salmo gairdneri (Fish, estuary, fresh water)
Endpoint:
Exposure period:
Unit: **Analytical monitoring:**
Method: other: BASF Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: The treatment of about 9 month old rainbow trouts (60 animals per group, both sexes) with 0,5%; 1% and 1,5% propionic acid in pellet–feed for 7 weeks caused a dose–dependent loss of body– weight up to 23,1% in the high dose group in comparison to untreated control.
The histopathology of 5 animals out of each group revealed a more pronounced expression of viscerale granulomas with increasing concentration, but large interindividuel variations. The viscerale granuloma syndrom in combination with nephrocalcinoses is reported to be of polyfactorial etiology.
Source: BASF AG Ludwigshafen

(43)

Species: Salmo gairdneri (Fish, estuary, fresh water)
Endpoint:
Exposure period:
Unit: **Analytical monitoring:**
Method: other: BASF Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: The treatment of about 9 month old rainbow trouts (60 animals per group, both sexes) with 0,5%; 1% and 1,5% propionic acid in pellet–feed for 7 weeks caused a dose–dependent loss of body– weight up to 23,1% in the high dose group in comparison to untreated control.
The histopathology of 5 animals out of each group revealed a more pronounced expression of viscerale granulomas with increasing concentration, but large interindividuel variations. The viscerale granuloma syndrom in combination with nephrocalcinoses is reported to be of polyfactorial etiology.
Source: BASF AG Ludwigshafen

(44)

4.5.2 Chronic Toxicity to Aquatic Invertebrates

Species: other
Endpoint:
Exposure period:
Unit: **Analytical monitoring:**
Method:
Year: **GLP:**
Test substance:
Remark: no data are available
Source: BASF AG Ludwigshafen

TERRESTRIAL ORGANISMS

4.6.1 Toxicity to Soil Dwelling Organisms

Type: other
Species:
Endpoint:
Exposure period:
Unit:
Method:
Year: **GLP:**
Test substance:
Remark: no data are available
Source: BASF AG Ludwigshafen

4.6.2 Toxicity to Terrestrial Plants

Species: other terrestrial plant: Lolium perenne, Raphanus sativus, Lactuca sativa
Endpoint:
Expos. period: 7 day
Unit:
Method: other
Year: **GLP:** no
Test substance:
Remark: EC0(7d) =10 ul/l, all species
Germination effects
Source: BASF AG Ludwigshafen
Test condition: Test method: Eastman Kodak Company, Health and Environment Laboratories Protocol according to Gorsuch,J.W. et al. (Chemical Effects on the Germination and Early Growth of Terrestrial Plants, Plants for Toxicity Assessment, ASTM STP 1091, 49–58, 1990

(27)

Species: other terrestrial plant: Tagetes patula, Raphanus sativus, Lactuca sativa, Zea mays
Endpoint:
Expos. period: 7 day
Unit:
Method: other
Year: **GLP:** no
Test substance:
Remark: Early growth effects
EC0(7d) =100 ul/l, all species
Source: BASF AG Ludwigshafen
Test condition: Test method: Eastman Kodak Company, Health and Environment Laboratories Protocol according to Gorsuch,J.W. et al. (Chemical Effects on the Germination and Early Growth of Terrestrial Plants, Plants for Toxicity Assessment, ASTM STP 1091, 49–58, 1990

(27)

4.6.3 Toxicity to other Non–Mamm. Terrestrial Species

Species: other
Endpoint:
Expos. period:
Unit:
Method:
Year: **GLP:**
Test substance:
Remark: no data are available
Source: BASF AG Ludwigshafen

4.7 Biological Effects Monitoring

Remark: no data are available
Source: BASF AG Ludwigshafen

4.8 Biotransformation and Kinetics

Type: other
Remark: no data are available
Source: BASF AG Ludwigshafen

4.9 Additional Remarks

Remark: Aedes aegyptii (insect, larva: 2nd–3rd instar): LC50(4h)= 800 mg/l or 0.08% v/v; static test; dist. water; 22–24 deg C
Source: BASF AG Ludwigshafen

(45)

Remark: Culex pipens (insect): LC50(48h) >1000 mg/l; static test
Source: BASF AG Ludwigshafen

(38)

Remark: Culex pipens (insect): LC50(48h) >1000 mg/l; static test
Source: BASF AG Ludwigshafen

(38)

5.1 Acute Toxicity

5.1.1 Acute Oral Toxicity

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 3470 mg/kg bw
Method: other: BASF-Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 - 1.4
Remark: apathy or restlessness, dyspnoea, partly cyanosis and accumulation of liquid in abdomen
Source: BASF AG Ludwigshafen

(46)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 4290 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: no further information
Source: BASF AG Ludwigshafen

(47) (48) (49) (50)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: > 400 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: 1%aqueous solution.
Source: BASF AG Ludwigshafen

(47) (51)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 5160 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(47) (52) (48)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 2600 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(53)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: 3920 – 4380 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: LD50 male rats: 4280 or 4380 mg/kg
LD50 female rats: 3920 or 4040 mg/kg
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(54)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: ca. 6400 mg/kg bw
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Remark: Symptoms: dyspnoea, apathy, abdominal position, piloerection Pathology: adhesion of stomach wall and liver
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionat

(55)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: ca. 6500 mg/kg bw
Method: other: BASF–Test
Year: **GLP:** no
Test substance: other TS
Remark: Symptoms: dyspnoes, apathy; pathology without findings.
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionat

(56)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 3470 mg/kg bw
Method: other: BASF–Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: apathy or restlessness, dyspnoea, partly cyanosis and accumulation of liquid in abdomen
Source: BASF AG Ludwigshafen

(57)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 4290 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: no further information
Source: BASF AG Ludwigshafen

(58) (48) (59) (50)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: > 400 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: 1%aqueous solution.
Source: BASF AG Ludwigshafen
(58) (60)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 5160 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(58) (52) (48)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 2600 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen
(61)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: ca. 6400 mg/kg bw
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Remark: Symptoms: dyspnoea, apathy, abdominal position, piloerection Pathology: adhesion of stomach wall and liver
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionat
(62)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: ca. 6500 mg/kg bw
Method: other: BASF–Test
Year: **GLP:** no
Test substance: other TS
Remark: Symptoms: dyspnoes, apathy; pathology without findings.
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionat

(63)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Value: = 835 – 1090 mg/kg bw
Method: other
Year: **GLP:** no data
Test substance: other TS: no data
Source: BASF AG Ludwigshafen
Reliability: (3) invalid

(64)

Type: LD50
Species: mouse
Sex:
Number of Animals:
Vehicle:
Value: = 5100 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(47) (52) (48)

Type: LD50
Species: mouse
Sex:
Number of Animals:
Vehicle:
Value: 2350 – 2900 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: LD50 male mice: 2350 or 2600 mg/kg
LD50 female mice: 2400 or 2900 mg/kg
Another value of 3340 mg/kg is cited from unidentifiable literature.

Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(54)

Type: LD50
Species: mouse
Sex:
Number of Animals:
Vehicle:
Value: = 5100 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(58) (52) (48)

Type: LD50
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Value: ca. 695 mg/kg bw
Method: other: BASF-Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 - 1.4
Remark: symptoms: lack of appetite, at doses above LD50 dyspnoea, atonia and staggering.
Source: BASF AG Ludwigshafen
(65)

Type: LD50
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Value: ca. 695 mg/kg bw
Method: other: BASF-Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 - 1.4
Remark: symptoms: lack of appetite, at doses above LD50 dyspnoea, atonia and staggering.
Source: BASF AG Ludwigshafen
(66)

5.1.2 Acute Inhalation Toxicity

Type: LC50
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 1 hour(s)
Value: > 19.7 mg/l
Method: other: BASF-Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 - 1.4
Remark: vapor-exposure, LC50 > 4,9 mg/l/4h (converted with Habers-rule) irritation of respiratory system, corneal opacities
Source: BASF AG Ludwigshafen

(67)

Type: LC50
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 4 hour(s)
Value: > 5.4 mg/l
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionate, dust aerosol

(68)

Type: LC50
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 4 hour(s)
Value: > 5.4 mg/l
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodiumpropionate, dust aerosol;

(69)

Type: LC50
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 4 hour(s)
Value: > 4.9 mg/l
Method: other: BASF Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: vapor–exposure, (converted with Habers–rule) irritation of respiratory system, corneal opacities
Source: BASF AG Ludwigshafen

(67)

Type: LC50
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 4 hour(s)
Value: > 5.4 mg/l
Method: other: BASF–Test
Year: **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionate, dust aerosol

(70)

Type: LC50
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 4 hour(s)
Value: > 5.4 mg/l
Method: other: BASF–Test
Year: **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodiumpropionate, dust aerosol;

(71)

Type: other: IRT
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 8 hour(s)
Value:
Method:
Year: **GLP:**
Test substance:
Remark: No mortality after 8 h exposure to an atmosphere enriched or saturated at 20 degree C. (0/6 rats)
Source: BASF AG Ludwigshafen
(49) (50)

Type: other: IRT
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 7 hour(s)
Value:
Method: other: in Anlehnung an die von H.F. Smith et al: Am.Ind.Hyg.Ass.J. 23, 95–107 (1962) beschriebene Methode durchgefuehrt
Year: 1962 **GLP:** no
Test substance: other TS
Remark: mortality 0/12 rats after 7 hours
Source: BASF AG Ludwigshafen
Test substance: Luprosil Salz (Zusammensetzung 75 % Propionsaeure und 20 % Calcium)
(72)

Type: other: IRT
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 8 hour(s)
Value:
Method:
Year: **GLP:**
Test substance:
Remark: No mortality after 8 h exposure to an atmosphere enriched or saturated at 20 degree C. (0/6 rats)
Source: BASF AG Ludwigshafen
(59) (50)

Type: other: IRT
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time: 7 hour(s)
Value:
Method: other: in Anlehnung an die von H.F. Smith et al: Am.Ind.Hyg.Ass.J. 23, 95-107 (1962) beschriebene Methode durchgefuehrt
Year: 1962 **GLP:** no
Test substance: other TS
Remark: mortality 0/12 rats after 7 hours
Source: BASF AG Ludwigshafen
Test substance: Luprosil Salz (Zusammensetzung 75 % Propionsaeure und 20 % Calcium)

(73)

Type:
Species: rat
Sex:
Number of Animals:
Vehicle:
Exposure time:
Value:
Method:
Year: **GLP:**
Test substance:
Remark: Acute inhalation studies with 5000, 2000, 800, 100 and 23mg/m3 propionic acid yielded irritant effects in the upper 3 concentrations and no effects at 100 and 23 mg/m3. Obviously no mortality occured. The somewhat confuse description of systemic effects is not useable.
Source: BASF AG Ludwigshafen

(74)

5.1.3 Acute Dermal Toxicity

Type: LD50
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Value: = 500 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: no further information
Source: BASF AG Ludwigshafen

(48) (49) (50)

Type: LD50
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Value: = 500 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: no further information
Source: BASF AG Ludwigshafen
(48) (59) (50)

Type: LD50
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Value: = 501 – 794 mg/kg bw
Method: other
Year: **GLP:** no data
Test substance: other TS: no data
Source: BASF AG Ludwigshafen
Reliability: (3) invalid
(64)

Type: LD50
Species: guinea pig
Sex:
Number of Animals:
Vehicle:
Value: 4.96 – 9.93 mg/kg bw
Method: other: see remarks
Year: **GLP:** no
Test substance: other TS
Remark: Test predates codification of GLPs.
Test method: Eastman Kodak Company, Health, Safety and Human Factors Laboratory Protocol. Doses of 2.5, 5, or 10ml/kg were applied to the depilated abdomen of guinea pigs under an occlusive wrap for 24 hours. One guinea pig was used at each dose level.
(d=0.9933)
Source: BASF AG Ludwigshafen
Test substance: Propionic acid
(75)

Type: LD50
Species: guinea pig
Sex:
Number of Animals:
Vehicle:
Value: 4960 – 9930 mg/kg bw
Method: other: see remarks
Year: **GLP:** no
Test substance: other TS
Remark: Test predates codification of GLPs.
Test method: Eastman Kodak Company, Health, Safety and Human Factors Laboratory Protocol. Doses of 2.5, 5, or 10ml/kg were applied to the depilated abdomen of guinea pigs under an occlusive wrap for 24 hours. One guinea pig was used at each dose level.
(d=0.9933)
Source: BASF AG Ludwigshafen
Test substance: Propionic acid

(75)

5.1.4 Acute Toxicity, other Routes

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.p.
Value: 200 – 400 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: 1% aqueous solution.
Source: BASF AG Ludwigshafen

(51)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.p.
Value: 200 – 400 mg/kg bw
Method: other: see remarks
Year: **GLP:** no
Test substance: other TS
Remark: Tests predate codification of GLPs.
Test method: Eastman Kodak Company, Laboratory of Industrial Medicine Protocol. The test material was administered as a 1% aqueous solution to five animals at dose levels ranging from 25 to 400 mg/kg body weight. One rat was used at each dose level. Rats were observed for 14 days; no necropsies were conducted.

Test result: The approximative intraperitoneal LD50 was between 200 and 400 mg/kg. Weakness and ataxia were observed in dosed animals.
Source: BASF AG Ludwigshafen
Test substance: Propionic acid

(76)

Type: LD50
Species: rat
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.p.
Value: 200 – 400 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: 1% aqueous solution.
Source: BASF AG Ludwigshafen

(60)

Type:
Species: cat
Sex:
Number of Animals:
Vehicle:
Route of admin.: s.c.
Value: 1000 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: Sleep
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(77)

Type:
Species: cat
Sex:
Number of Animals:
Vehicle:
Route of admin.: s.c.
Value: 1000 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: Sleep
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(78)

Type:
Species: dog
Sex:
Number of Animals:
Vehicle:
Route of admin.: s.c.
Value: 925 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: Total dose 14,8 g. 1,05 g propionic acid excreted in urine. No abnormalities detected.
Source: BASF AG Ludwigshafen

(77)

Type:
Species: dog
Sex:
Number of Animals:
Vehicle:
Route of admin.: s.c.
Value: 925 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: Total dose 14,8 g. 1,05 g propionic acid excreted in urine. No abnormalities detected.
Source: BASF AG Ludwigshafen

(78)

Type: LD50
Species: mouse
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: = 625 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: 10 % aqueous solution
Source: BASF AG Ludwigshafen

(79)

Type:
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: 1320 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: Lethal dose.
Source: BASF AG Ludwigshafen

(77)

Type:
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: 2200 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: Sedation or narcosis for about 1h, afterwards no abnormalities
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(77)

Type:
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: 1320 mg/kg bw
Method:
Year: **GLP:**
Test substance:
Remark: Lethal dose.
Source: BASF AG Ludwigshafen

(78)

Type:
Species: rabbit
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: 2200 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: Sedation or narcosis for about 1h, afterwards no abnormalities
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(78)

Type:
Species: dog
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: 570 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: dullness, narcosis, vomiting
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(77)

Type:
Species: dog
Sex:
Number of Animals:
Vehicle:
Route of admin.: i.v.
Value: 570 mg/kg bw
Method:
Year: **GLP:**
Test substance: other TS
Remark: dullness, narcosis, vomiting
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(78)

5.2 Corrosiveness and Irritation

5.2.1 Skin Irritation

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: corrosive
EC classificat.:
Method: other: BASF-Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 - 1.4
Remark: Necrosis after exposure periods of 5 and 15 minutes but not after 1 minute.
Source: BASF AG Ludwigshafen

(80)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: corrosive
EC classificat.:
Method: other: DOT Methode were conducted in accordance with 19 CFR, Chapter I, Sec, 173.40 as amendment in Federal Register, Vol. 37, No. 57, March 23, 1972.
Year: 1972 **GLP:**
Test substance:
Remark: DOT-Method, 4h occlusive application to intact and abraded skin
Source: BASF AG Ludwigshafen

(81)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: 15% solution of propionic acid in water, not corrosive
Source: BASF AG Ludwigshafen

(82)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Irritant, grade 6 of 10
Source: BASF AG Ludwigshafen

(48) (83) (84)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Local damage may occur to skin on contact with concentrated solutions of propionic acid.
Source: BASF AG Ludwigshafen

(51)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: not irritating
EC classificat.:
Method: Draize Test
Year: 1973 **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionate feed grade, sodiumpropionate

(85)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: irritating
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Mild skin irritation was seen following 4 h closed contact of the skin with a 2.5 % aqueous solution, mild to moderate irritation occured with 25 % solutions, while moderate to severe irritation and corrosion were seen at concentrations of 40 % and above.
Source: BASF AG Ludwigshafen

(86)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: corrosive
EC classificat.:
Method: other: BASF–Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: Necrosis after exposure periods of 5 and 15 minutes but not after 1 minute.
Source: BASF AG Ludwigshafen

(87)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Irritant, grade 6 of 10
Source: BASF AG Ludwigshafen

(48) (59) (50)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Local damage may occur to skin on contact with concentrated solutions of propionic acid.
Source: BASF AG Ludwigshafen

(60)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: not irritating
EC classificat.:
Method: Draize Test
Year: 1973 **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionate feed grade, sodiumpropionate

(73)

Species: rabbit
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: corrosive
EC classificat.: corrosive (causes burns)
Method: other
Year: **GLP:** no data
Test substance: other TS: no data
Result: Corrosive within 4 hours
Source: BASF AG Ludwigshafen
Test condition: Exposure time: 4 and 24 hours
Test substance (0.5 ml) was applied undiluted.
Reliability: (3) invalid

(64)

Species: guinea pig
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result: irritating
EC classificat.:
Method: other: see remarks
Year: **GLP:** no
Test substance: other TS
Remark: Test predates codification of GLPs.
Test method: Eastman Kodak Company, Health, Safety and Human Factors Laboratory Protocol. Doses of 2.5, 5, or 10 ml/kg were applied to the depilated abdomen of guinea pigs under an occlusive wrap for 24 hours. One guinea pig was used at each dose level.
Test result: The test material was determined to be a severe irritant to guinea pig skin under the conditions of the test.
Source: BASF AG Ludwigshafen
Test substance: Propionic acid

(75)

Species: mammal
Concentration:

Exposure:
Exposure Time:
Number of Animals:
PDII:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance: other TS
Remark: species: dog and cat, irritation
depending on pH of solution: alkaline pH (8,4) irritant (like bicarbonate), neutral pH not irritant.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(88)

5.2.2 Eye Irritation

Species: rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: not irritating
EC classificat.:
Method:
Year: **GLP:**
Test substance: other TS
Remark: Sodium propionate, 20% solution, no description of method.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(88)

Species: rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Irritant, grade 9 of 10
Source: BASF AG Ludwigshafen

(48) (83) (50)

Species: rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: not irritating
EC classificat.:
Method: Draize Test
Year: 1973 **GLP:** no
Test substance: other TS
Remark: Calciumpropionate feed grade, sodiumpropionate
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionat

(85)

Species: rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: Irritant, grade 9 of 10
Source: BASF AG Ludwigshafen

(48) (59) (50)

Species: rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: not irritating
EC classificat.:
Method: Draize Test
Year: 1973 **GLP:** no
Test substance: other TS
Remark: Calciumpropionate feed grade, sodiumpropionate
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionat

(73)

Species: rabbit
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result: corrosive
EC classificat.: risk of serious damage to eyes
Method: other
Year: **GLP:** no data
Test substance: other TS: no data
Source: BASF AG Ludwigshafen
Test condition: 0.1 ml were applied undiluted; exposure time: 1 min, 24 hrs; 14 days: ulceration
Reliability: (3) invalid

(64)

Species: rat
Concentration:
Dose:
Exposure Time:
Comment:
Number of Animals:
Result:
EC classificat.:
Method:
Year: **GLP:**
Test substance:
Remark: In a 4 h inhalation study atmospheric concentrations of around 5 mg/l propionic acid produced slight eye irritation during, and several hours after exposure.
Source: BASF AG Ludwigshafen

(89)

5.3 Sensitization

Type: Guinea pig maximization test
Species: guinea pig
Number of Animals:
Vehicle:
Result: not sensitizing
Classification:
Method: other: according to the method described by Magnusson and Kligmann "Allergie contact dermatitis in the guinea pig" Ed. Ch.C. Thomas, Springfield, Illinois, USA (1970)
Year: 1970 **GLP:** no
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium– and sodiumpropionate

(90)

5.4 Repeated Dose Toxicity

Species: rat **Sex:** male
Strain: Wistar
Route of admin.: inhalation
Exposure period: 3-4 weeks
Frequency of treatment: "continuous exposure"
Post. obs. period:
Doses: 23 and 100 mg/m3
Control Group:
Method:
Year: **GLP:**
Test substance:
Remark: Due to major deficiencies in presentation of the data the study is considered to be not valid.
Result: Changes in lung tissue, bronchitis, peribronchitis, desquamation. The confuse presentation of further systemic effects is not usable.
Source: BASF AG Ludwigshafen

(74)

Species: rat **Sex:**
Strain: Wistar
Route of admin.: inhalation
Exposure period: 3-month
Frequency of treatment:
Post. obs. period:
Doses: 0,017; 0,17; 1,7 mg/m3
Control Group: yes
NOAEL: 1700 mg/l
Method:
Year: **GLP:**
Test substance:
Remark: Due to major deficiencies in presentation of the data the study is considered to be not valid.
Result: No morphological changes.
The clinical findings are undistinguishable confused with acute and subacute (?) studies.
Source: BASF AG Ludwigshafen

(74)

Species: rat **Sex:** male/female
Strain: Sprague-Dawley
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period: 42 days, 10 rats per sex of control, 6200 and 50000ppm groups
Doses: 6200, 12500, 25000, 50000ppm (=517;1042;2083;4167mg/kg b.w.)
Control Group: yes, concurrent no treatment
NOAEL: 6200 ppm
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Result: 20 rats per sex and dosage, 10 rats per sex and dosage for post- exposure-observation-period
50000ppm: feed intake and body weight gain of male animals reduced, no other clinical, hematological or clinicochemical effects, single slight deviations of absolute and relative organ weights without pathological significance, no macroscopic findings, proliferation-acanthosis and retention-hyperceratosis of forestomach mucosa. Reversibility in post-exposure-observation-period. 25000 and 12500ppm: dose-dependent occurance of forestomach- lesions as in the high dosage group, no significant other effects.
Source: BASF AG Ludwigshafen
Test substance: Propionsaeure technisch

(47) (91)

Species: rat **Sex:** male/female
Strain: Sprague-Dawley
Route of admin.: oral feed
Exposure period: 28 days
Frequency of treatment: daily
Post. obs. period:
Doses: 10000, 20000, 50000ppm
Control Group: yes, concurrent no treatment
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Result: 10 rats per sex and dosage group. Substance intake approx. 800, 1500 and 3900 mg/kg b.w. (Calc. from feed consumption). 50000 ppm: decrease in weight gain of the male animals, no other clinical, hematological or clinicochemical effects, decrease in absolute liverweight of male animals, no change in relative organweights, histologically detected proliferation-acanthosis and retention-hyperceratosis of the forestomach mucosa. 20000 and 10000 ppm: dose-dependent occurence of mucosal lesions of forestomach, no other symptoms.
Source: BASF AG Ludwigshafen

(47) (92)

Species: rat **Sex:** male
Strain: Sprague–Dawley
Route of admin.: oral feed
Exposure period: 30 days
Frequency of treatment: daily
Post. obs. period:
Doses: 4% (=40000ppm)
Control Group: yes, concurrent no treatment
Method:
Year: **GLP:**
Test substance: as prescribed by 1.1 – 1.4
Remark: Study was performed in order to assess the onset of lesions in the forestomach.
Result: 5 rats per sacrifice, sacrifices on days 2,4,7,10,14,22 and 30. Mean substance intake 3370mg/kg b.w. (calculated from feed intake).
No treatment related clinical findings. Pathology restricted to the forestomach. Macroscopic lesions from day ten onward, prominent limiting ridge and visible mucosal alterations. Histopathology: From day 2 onward acanthosis and hyperkeratosis, from day 14 basal cell hyperplasia. Ulcer in 1 rat and polyplike lesions in 3 animals after 22 and 30 days.
Source: BASF AG Ludwigshafen

(93)

Species: rat **Sex:**
Strain:
Route of admin.: oral feed
Exposure period: 3–4 weeks
Frequency of treatment:
Post. obs. period:
Doses: 1 and 3% (10000 and 30000ppm = 830 and 2490mg/kg)
Control Group: yes, concurrent no treatment
Method:
Year: **GLP:**
Test substance: other TS
Result: The application of 1% sodium or calcium propionate in feed for 4 weeks or of 3% of the substances for 3 weeks did not reduce weight gain in comparison to the control animals. No other parameters determined.
Source: BASF AG Ludwigshafen
Test substance: Sodium and Calcium propionate

(94)

Species: rat **Sex:** male
Strain: Fischer 344
Route of admin.: oral feed
Exposure period: 9, 15, 21, 27 days
Frequency of treatment: daily
Post. obs. period:
Doses: 4% (40000ppm = 3320mg/kg)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: The incorporation of Methyl–H3–Thymidine into the mucosa of the forestomach was not influenced after 9 and 15 days but was enhanced after 21 and 28 days of treatment. Macroscopic and histologic lesions (general and nodular mucosal thickening) were observed in the forestomach after 27 days.
Source: BASF AG Ludwigshafen

(95)

Species: rat **Sex:** male/female
Strain: other: albino, mongrels
Route of admin.: oral feed
Exposure period: 110 days
Frequency of treatment: daily
Post. obs. period:
Doses: about 5% (50000ppm = 3300mg/kg)
Control Group:
Method:
Year: **GLP:**
Test substance:
Result: 5 rats.
No systemic toxicity.
1/5 early death. 3/4 umbilicate or warty lesions of forestomach mucosa, 1/4 no abnormalities. Hyperkeratosis and hyperplasia of forestomach mucosa. No lesions in the glandular stomach. Similar effects after treatment with butyric acid (even more effective) and valeric acid.
Source: BASF AG Ludwigshafen

(47) (96)

Species: rat **Sex:** female
Strain: other: Wistar (SLC)
Route of admin.: oral feed
Exposure period: 1 year
Frequency of treatment: daily
Post. obs. period:
Doses: 2% (20000ppm = 1320mg/kg), calculated total intake 185g/animal
Control Group: yes, concurrent no treatment
NOAEL: 2 %
Method:
Year: **GLP:**
Test substance: other TS
Remark: Japanes article with tables and abstracts in english.
Result: Very slight retardation of growth rate (b.w. at the end of the study 290g versa 299g in control). No hematological, clinicochemical or urinalytic changes. No changes in organ weights. Histopathology: different spontaneous findings without substance relation, thereof 2 mammary tumours and 1 myxoma of the uterus. These findings are considered to be not substance related because in a test group fed simultaniously with 2% sodium propionate and 5% sorbic acid no such changes occured.
(40 animals per group)
Source: BASF AG Ludwigshafen
Test substance: sodium propionate

(47) (97)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: 1 year
Frequency of treatment: daily
Post. obs. period:
Doses: The animals were maintained on a feed consisting in 75% bread which was baked under addition of the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: The animals were maintained on a feed consisting in 75% bread which was baked under addition of the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Interim sacrifices were performed and a number of organs were examined histologically. No clinical nor pathological effects were observed. Therefore the authors conclude that neither the single substances nor their mixture cause toxic effects. The complex mixture of substances and conduct of the study make it difficult to judge on the real effect, if at all for single substances.
Source: BASF AG Ludwigshafen

Test substance: Sodium propionate, 27 animals per sex (47) (51) (98) (48)

Species: rat **Sex:** male
Strain: Wistar
Route of admin.: oral feed
Exposure period: 32 weeks
Frequency of treatment: daily
Post. obs. period:
Doses: The animals were maintained on a feed consisting in 75% of a bakiing mixture for bread which contained the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: The animals were maintained on a feed consisting in 75% of a baking mixture for bread which contained the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Groups fed with diets containing 5% propionate show a reduction in body weight gain but no substance related histopathological effects were observed. The study was furthermore complicated by infections in different testgroups. The complex mixture of substances and conduct of the study make it difficult to judge on the real effect, if at all for single substances.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate, 30 animals (47) (99)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: f 4 weeks, m 8 weeks
Frequency of treatment: daily
Post. obs. period: 1 group m 8 weeks
Doses: 4% (40000ppm = 3320mg/kg KGW)
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: Wistar Han/BGA, 5 animals/sex
Clinical examination and organ weights without abnormalities. Forestomach 4 week exposure: hyperkeratosis and hyperplasie of l limiting ridge, isolated ulcerations in 4/5 animals. Forestomach 8 week exposure: more pronounced lesions in number and expression.
Reversibility of changes in 8 week post exposure observation period.
Similar effects produced by 4 and 6% acetic acid or 4% capronic acid.

Source: BASF AG Ludwigshafen
(100) (101)

Species: rat **Sex:** male
Strain: Wistar
Route of admin.: oral feed
Exposure period: 4 weeks
Frequency of treatment: daily
Post. obs. period:
Doses: 4% (40000ppm = 3320mg/kg KGW)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Clinical examination and organ weights without abnormalities. Forestomach : limiting ridge slightly thickend in 3/5, mucosa macroscopically unchanged. Histology: hyperkeratosis of mucosa, hyperplasia of basal cells at the limiting ridge in 1/5. In general obviously slighter forestomach-changes as compared to the acid. Similar effects produced by 4% Sodium acetate.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate, Wistar Han/BGA, 5 animals
(100) (102)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: f 4 weeks, m 8 weeks
Frequency of treatment: daily
Post. obs. period:
Doses: 4% (40000ppm = 3320mg/kg KGW)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Reduction of feed consumption, body weight gain and abs. organ weights.
Forestomach: 4 week exposure: Slight thickening of limiting ridge. Hyperkeratosis and hyperplasie of mucosa clearly far less pronounced compared to the acid.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate, Wistar Han/BGA, 5 animals/sex.
(100) (102)

Species: rat **Sex:** male/female
Strain: other: Wistar Han/BGA
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period: 1 group for 0,1 or 4% respectively over 90 and 180 days
Doses: 0,2; 0,5; 1 and 4% (= 166, 415, 830, 3320mg/kg B.W.)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Wistar Han/BGA, 10 animals/sex.
Clinical and hematological examination and organ weights without abnormalities.
Forestomach males: hyperkeratosis and hyperplasia of mucosa, at 4% 1/10 atypical basal cell proliferation and 5/10 dysplasia. Forestomach females: hyperkeratosis and hyperplasia at 4% (hyperkeratosis also in controls) in differnt regions of forestomach. Effects largely reversible during 90-day post exposure observation period. After 180 days appearance of first agerelated changes in the forestomach.
NOEL: male: 0.2 %, female 1%
Source: BASF AG Ludwigshafen

(103)

Species: rat **Sex:** male
Strain:
Route of admin.: oral feed
Exposure period: 56 days
Frequency of treatment: daily
Post. obs. period:
Doses: 20000 and 40000ppm
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: 30% and 70% soy protein diets were used which were partly supplemented with vitamin B12. Reduction in body weight occurred in comparison to the soy protein diets without propionate addition. This was more pronounced in the 30% diet and independent of vit. B12 supplementation.
No other toxicological parameters were investigated.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(104)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: 7 days
Frequency of treatment: continued
Post. obs. period: no
Doses: 4 % in diet
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: The test- and control groups consisted of 5 male and 5 female rats. No significant clinical signs were recorded during the treatment.
The stomach walls of the treated rats were occasionally thickened and the mucosal surface was discoloured in several animals. In the forestomach of treated rats acanthosis, epithelial vacuolation and oedema of the lamina propria were reported. In the limiting ridge an increased number of mitotic figures were seen.
Source: BASF AG Ludwigshafen

(105) (106)

Species: rat **Sex:** male/female
Strain: Sprague-Dawley
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period: 42 days, 10 rats per sex of control, 6200 and 50000ppm groups
Doses: 6200, 12500, 25000, 50000ppm (=517;1042;2083;4167mg/kg b.w.)
Control Group: yes, concurrent no treatment
NOAEL: 6200 ppm
Method: other: BASF-Test
Year: **GLP:** no
Test substance: other TS
Result: 20 rats per sex and dosage, 10 rats per sex and dosage for post- exposure-observation-period
50000ppm: feed intake and body weight gain of male animals reduced, no other clinical, hematological or clinicochemical effects, single slight deviations of absolute and relative organ weights without pathological significance, no macroscopic findings, proliferation-acanthosis and retention-hyperceratosis of forestomach mucosa. Reversibility in post-exposure-observation-period. 25000 and 12500ppm: dose-dependent occurance of forestomach- lesions as in the high dosage group, no significant other effects.
Source: BASF AG Ludwigshafen
Test substance: Propionsaeure technisch

(58) (107)

Species: rat **Sex:** male/female
Strain: Sprague–Dawley
Route of admin.: oral feed
Exposure period: 28 days
Frequency of treatment: daily
Post. obs. period:
Doses: 10000, 20000, 50000ppm
Control Group: yes, concurrent no treatment
Method: other: BASF–Test
Year: **GLP:** no
Test substance: other TS
Result: 10 rats per sex and dosage group. Substance intake approx. 800, 1500 and 3900 mg/kg b.w. (Calc. from feed consumption). 50000 ppm: decrease in weight gain of the male animals, no other clinical, hematological or clinicochemical effects, decrease in absolute liverweight of male animals, no change in relative organweights, histologically detected proliferation–acanthosis and retention–hyperceratosis of the forestomach mucosa. 20000 and 10000 ppm: dose–dependent occurence of mucosal lesions of forestomach, no other symptoms.
Source: BASF AG Ludwigshafen

(58) (108)

Species: rat **Sex:** male/female
Strain: other: albino, mongrels
Route of admin.: oral feed
Exposure period: 110 days
Frequency of treatment: daily
Post. obs. period:
Doses: about 5% (50000ppm = 3300mg/kg)
Control Group:
Method:
Year: **GLP:**
Test substance:
Result: 5 rats.
No systemic toxicity.
1/5 early death. 3/4 umbilicate or warty lesions of forestomach mucosa, 1/4 no abnormalities. Hyperkeratosis and hyperplasia of forestomach mucosa. No lesions in the glandular stomach. Similar effects after treatment with butyric acid (even more effective) and valeric acid.
Source: BASF AG Ludwigshafen

(58) (96)

Species: rat **Sex:** female
Strain: other: Wistar (SLC)
Route of admin.: oral feed
Exposure period: 1 year
Frequency of treatment: daily
Post. obs. period:
Doses: 2% (20000ppm = 1320mg/kg), calculated total intake 185g/animal
Control Group: yes, concurrent no treatment
NOAEL: 2 %
Method:
Year: **GLP:**
Test substance: other TS
Remark: Japanes article with tables and abstracts in english.
Result: Very slight retardation of growth rate (b.w. at the end of the study 290g versa 299g in control). No hematological, clinicochemical or urinalytic changes. No changes in organ weights. Histopathology: different spontaneous findings without substance relation, thereof 2 mammary tumours and 1 myxoma of the uterus. These findings are considered to be not substance related because in a test group fed simultaniously with 2% sodium propionate and 5% sorbic acid no such changes occured.
(40 animals per group)
Source: BASF AG Ludwigshafen
Test substance: sodium propionate

(58) (97)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: 1 year
Frequency of treatment: daily
Post. obs. period:
Doses: The animals were maintained on a feed consisting in 75% bread which was baked under addition of the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: The animals were maintained on a feed consisting in 75% bread which was baked under addition of the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Interim sacrifices were performed and a number of organs were examined histologically. No clinical nor pathological effects were observed. Therefore the authors conclude that neither the single substances nor their mixture cause toxic effects. The complex mixture of substances and conduct of the study make it difficult to judge on the real effect, if at all for single substances.
Source: BASF AG Ludwigshafen

Test substance: Sodium propionate, 27 animals per sex (58) (60) (98) (48)

Species: rat **Sex:** male
Strain: Wistar
Route of admin.: oral feed
Exposure period: 32 weeks
Frequency of treatment: daily
Post. obs. period:
Doses: The animals were maintained on a feed consisting in 75% of a bakiing mixture for bread which contained the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: The animals were maintained on a feed consisting in 75% of a baking mixture for bread which contained the 50 fold amount of 4 bread additives and bleached flour. One of the additives was 5% sodium propionate.
Groups fed with diets containing 5% propionate show a reduction in body weight gain but no substance related histopathological effects were observed. The study was furthermore complicated by infections in different testgroups. The complex mixture of substances and conduct of the study make it difficult to judge on the real effect, if at all for single substances.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate, 30 animals (58) (99)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: f 4 weeks, m 8 weeks
Frequency of treatment: daily
Post. obs. period: 1 group m 8 weeks
Doses: 4% (40000ppm = 3320mg/kg KGW)
Control Group: yes
Method:
Year: **GLP:**
Test substance: other TS
Result: Wistar Han/BGA, 5 animals/sex
Clinical examination and organ weights without abnormalities. Forestomach 4 week exposure: hyperkeratosis and hyperplasie of l limiting ridge, isolated ulcerations in 4/5 animals. Forestomach 8 week exposure: more pronounced lesions in number and expression.
Reversibility of changes in 8 week post exposure observation period.
Similar effects produced by 4 and 6% acetic acid or 4% capronic acid.

Source: BASF AG Ludwigshafen
(58) (109)

Species: rat **Sex:** male
Strain: Wistar
Route of admin.: oral feed
Exposure period: 4 weeks
Frequency of treatment: daily
Post. obs. period:
Doses: 4% (40000ppm = 3320mg/kg KGW)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Clinical examination and organ weights without abnormalities. Forestomach : limiting ridge slightly thickend in 3/5, mucosa macroscopically unchanged. Histology: hyperkeratosis of mucosa, hyperplasia of basal cells at the limiting ridge in 1/5. In general obviously slighter forestomach-changes as compared to the acid. Similar effects produced by 4% Sodium acetate.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate, Wistar Han/BGA, 5 animals
(58) (109)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: f 4 weeks, m 8 weeks
Frequency of treatment: daily
Post. obs. period:
Doses: 4% (40000ppm = 3320mg/kg KGW)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Reduction of feed consumption, body weight gain and abs. organ weights.
Forestomach: 4 week exposure: Slight thickening of limiting ridge. Hyperkeratosis and hyperplasie of mucosa clearly far less pronounced compared to the acid.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate, Wistar Han/BGA, 5 animals/sex.
(58) (109)

Species: rat **Sex:** male/female
Strain: other: Wistar Han/BGA
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period: 1 group for 0,1 or 4% respectively over 90 and 180 days
Doses: 0,2; 0,5; 1 and 4% (= 166, 415, 830, 3320mg/kg B.W.)
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Wistar Han/BGA, 10 animals/sex.
Clinical and hematological examination and organ weights without abnormalities.
Forestomach males: hyperkeratosis and hyperplasia of mucosa, at 4% 1/10 atypical basal cell proliferation and 5/10 dysplasia. Forestomach females: hyperkeratosis and hyperplasia at 4% (hyperkeratosis also in controls) in differnt regions of forestomach. Effects largely reversible during 90–day post exposure observation period. After 180 days appearance of first agerelated changes in the forestomach.
NOEL: male: 0.2 %, female 1%
Source: BASF AG Ludwigshafen

(109)

Species: rat **Sex:** male/female
Strain: Wistar
Route of admin.: oral feed
Exposure period: 7 days
Frequency of treatment: continued
Post. obs. period: no
Doses: 4 % in diet
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: The test– and control groups consisted of 5 male and 5 female rats. No significant clinical signs were recorded during the treatment.
The stomach walls of the treated rats were occasionally thickened and the mucosal surface was discoloured in several animals. In the forestomach of treated rats acanthosis, epithelial vacuolation and oedema of the lamina propria were reported. In the limiting ridge an increased number of mitotic figures were seen.
Source: BASF AG Ludwigshafen

(106) (110)

Species: rat **Sex:** male
Strain: Wistar
Route of admin.: gavage
Exposure period: 1; 3; 7; 14 or 28 days
Frequency of treatment: daily
Post. obs. period: no
Doses: 300 mg/kg
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: No treatment related findings in the forestomach were found after 1 and 3 days of treatment.
After 7 and more days of treatment thickening of the forestomach mucosa respectively hyperplasia of the squamous epithelium with marked desquamation were found.
Source: BASF AG Ludwigshafen

(111)

Species: mouse **Sex:** male/female
Strain: B6C3F1
Route of admin.: oral feed
Exposure period: 7 days
Frequency of treatment: continued
Post. obs. period: no
Doses: 4 % in diet
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Test and control groups consisted of 5 male and 5 female mice. No significant clinical signs were recorded during the treatment. One male and two female mice receiving propionic acid in diet had thick stomach walls. In forestomach basal cell hyperplasia and epithelial downgrowths were reported, no treatment–related findings were detected in the limiting ridge.
Source: BASF AG Ludwigshafen

(112) (106)

Species: mouse **Sex:** male/female
Strain: B6C3F1
Route of admin.: oral feed
Exposure period: 7 days
Frequency of treatment: continued
Post. obs. period: no
Doses: 4 % in diet
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Test and control groups consisted of 5 male and 5 female mice. No significant clinical signs were recorded during the treatment. One male and two female mice receiving propionic acid in diet had thick stomach walls. In forestomach basal cell hyperplasia and epithelial downgrowths were reported, no treatment-related findings were detected in the limiting ridge.
Source: BASF AG Ludwigshafen

(106) (110)

Species: mouse **Sex:** female
Strain: other: Crl:CD1(ICR)BR
Route of admin.: dermal
Exposure period: 90 days
Frequency of treatment: each working day
Post. obs. period: no
Doses: 50ul of 8%, 10% and 14% aqueous solution (133, 167, 233 mg/kg bw)
Control Group: yes
NOAEL: < 8 %
Method: OECD Guide-line 409 "Subchronic Oral Toxicity - Non-rodent: 90-day Study"
Year: 1981 **GLP:** yes
Test substance: as prescribed by 1.1 - 1.4
Remark: At the beginning of the study the applied concentrations were 6%, 8% and 10%. When after 3 weeks of treatment no dermal effects occured the low concentration was increased to 14%.
Result: No influence of treatment on body weight and body weight gain. Further clinical effects of systemic toxicity were not described and no clinico-chemical investigation or pathology other than for skin lesions was performed.
Skin effects:
14%: all animals showed skin lesions ranging from erythema and crust formation to ulceration. This was affirmed pathologically and histology revealed acanthosis and fibrous condensation with inflammation of connective tissue.
10%: 6/10 animals showed skin lesions which were in general less pronounced than in the high concentration. The same histological findings as in the high concentration group occured. 8%: no clinically detectable skin lesions were seen but in 5 animals histological alterations as described above

could be detected.
The results of the study indicate that a non–irritant concentration lies below 8% and the MTD between 10 and 14%.

Source: BASF AG Ludwigshafen

(113)

Species: Syrian hamster **Sex:** male/female
Strain:
Route of admin.: oral feed
Exposure period: 7 days
Frequency of treatment: continued
Post. obs. period: no
Doses: 4 % in diet
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Test– and control group consisted of 5 male and 5 female rats. No significant clinical signs were recorded during the treatment.
The stomachs of the hamsters recieving propionic acid in diet were normal but one hamster had haemorrhagic lungs. In the forestomachs nuclear vacuolation and thinning of the epithelium in the limiting ridges was reported.
Source: BASF AG Ludwigshafen

(112) (106)

Species: Syrian hamster **Sex:** male/female
Strain:
Route of admin.: oral feed
Exposure period: 7 days
Frequency of treatment: continued
Post. obs. period: no
Doses: 4 % in diet
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Result: Test– and control group consisted of 5 male and 5 female rats. No significant clinical signs were recorded during the treatment.
The stomachs of the hamsters recieving propionic acid in diet were normal but one hamster had haemorrhagic lungs. In the forestomachs nuclear vacuolation and thinning of the epithelium in the limiting ridges was reported.
Source: BASF AG Ludwigshafen

(106) (110)

Species: dog **Sex:** male/female
Strain: Beagle
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period: control and high dosage for 6 weeks
Doses: 3000, 10000, 30000 ppm
Control Group: yes, concurrent no treatment
Method: OECD Guide-line 409 "Subchronic Oral Toxicity - Non-rodent: 90-day Study"
Year: 1981 **GLP:** yes
Test substance: as prescribed by 1.1 - 1.4
Result: 4 animals per sex and exposure and untreated postexposure group. Substance intake about 200, 700 and 2000 mg/kg b.w. High dosage: lack of appetite, no other substance related clinical, hematological, clinico-chemical effect. More pronounced expression of spontaneous epithelial hyperplasia of esophageal mucosa as compared to control. This finding was reversible in the post exposure observation period. No other pathological findings. Mid- and low-dosage groups without substance-related findings.
Source: BASF AG Ludwigshafen

(103) (114)

Species: dog **Sex:** male
Strain: Beagle
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period:
Doses: 14500,43500ppm
Control Group: yes, concurrent no treatment
Method:
Year: **GLP:** yes
Test substance: other TS
Remark: No hematological or clinicochemical parameters determined.
Result: High dose: diarrhoea and vomiting in all animals, low dosage: only in one dog. Similar spontaneous epithelial hyperplasia of esophageal mucosa in all groups including control without relation to treatment.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionat

(115) (116)

Species: dog **Sex:** male/female
Strain: Beagle
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period: control and high dosage for 6 weeks
Doses: 3000, 10000, 30000 ppm
Control Group: yes, concurrent no treatment
Method: OECD Guide-line 409 "Subchronic Oral Toxicity - Non-rodent: 90-day Study"
Year: 1981 **GLP:** yes
Test substance: as prescribed by 1.1 - 1.4
Result: 4 animals per sex and exposure and untreated postexposure group. Substance intake about 200, 700 and 2000 mg/kg b.w. High dosage: lack of appetite, no other substance related clinical, hematological, clinico-chemical effect. More pronounced expression of spontaneous epithelial hyperplasia of esophageal mucosa as compared to control. This finding was reversible in the post exposure observation period. No other pathological findings. Mid- and low-dosage groups without substance-related findings.
Source: BASF AG Ludwigshafen

(109) (114) (117)

Species: dog **Sex:** male
Strain: Beagle
Route of admin.: oral feed
Exposure period: 90 days
Frequency of treatment: daily
Post. obs. period:
Doses: 14500,43500ppm
Control Group: yes, concurrent no treatment
Method:
Year: **GLP:** yes
Test substance: other TS
Remark: No hematological or clinicochemical parameters determined.
Result: High dose: diarrhoea and vomiting in all animals, low dosage: only in one dog. Similar spontaneous epithelial hyperplasia of esophageal mucosa in all groups including control without relation to treatment.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionat

(109) (118)

Species: hen **Sex:** male
Strain:
Route of admin.: oral feed
Exposure period: 38 days
Frequency of treatment: daily
Post. obs. period:
Doses: 3%
Control Group:
Method: other: BASF–Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: The study intended to investigate the influence of propionic acid in feed on Salmonella infection. In 1 group PA was the sole aditive, in several other groups additionally Monensin and Avotan were given.
Result: No histopathological findings in crop, esophagus stomach and bowel.
Source: BASF AG Ludwigshafen

(47) (119)

Species: hen **Sex:** male
Strain:
Route of admin.: oral feed
Exposure period: 38 days
Frequency of treatment: daily
Post. obs. period:
Doses: 3%
Control Group:
Method: other: BASF–Test
Year: **GLP:** no
Test substance: as prescribed by 1.1 – 1.4
Remark: The study intended to investigate the influence of propionic acid in feed on Salmonella infection. In 1 group PA was the sole aditive, in several other groups additionally Monensin and Avotan were given.
Result: No histopathological findings in crop, esophagus stomach and bowel.
Source: BASF AG Ludwigshafen

(58) (120)

Species: monkey **Sex:** no data
Strain:
Route of admin.: oral feed
Exposure period: 9 weeks
Frequency of treatment: continued
Post. obs. period: keine Angaben
Doses: 2 % Natriumpropionat in diet (= 420 mg/kg bw/day)
Control Group: no data specified
Method:
Year: **GLP:**
Test substance: other TS
Result: There were no overt toxic effects recorded in 12 monkeys that had recieved a diet containing 2 % sodium propionate for 9 weeks. Examination was limited to blood and liver.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(121)

Species: pig **Sex:**
Strain:
Route of admin.: oral feed
Exposure period:
Frequency of treatment:
Post. obs. period:
Doses: 3 and 4%
Control Group:
Method:
Year: **GLP:**
Test substance:
Remark: No full document available, excerpt of pathology report.
Result: 3 or 4% propionic acid in pig–feed resulted in gastritis fibrinosa and Entritis catarrhalis desquamativa of small intestine. Also fat accumulation in single liver cells or small cell clusters occured.
Source: BASF AG Ludwigshafen

(122)

Species: pig **Sex:**
Strain:
Route of admin.: oral feed
Exposure period:
Frequency of treatment:
Post. obs. period:
Doses: 1,2 and 3%
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Remark: No full document available, excerpt from part of the report.
Result: 12 animals per group. Fattening from 24 to 93kg.
No negative influence on fattening, feed utilisation and meat quality.
Source: BASF AG Ludwigshafen

(123)

Species: pig **Sex:**
Strain:
Route of admin.: oral feed
Exposure period:
Frequency of treatment:
Post. obs. period:
Doses: 1,2 and 3%
Control Group: yes
Method:
Year: **GLP:**
Test substance:
Remark: No full document available, excerpt from part of the report.
Result: 12 animals per group. Fattening from 24 to 93kg.
No negative influence on fattening, feed utilisation and meat quality.
Source: BASF AG Ludwigshafen

(122)

5.5 Genetic Toxicity 'in Vitro'

Type: Ames test
System of testing: S.typhimurium NTP standardbattery
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen

(124)

Type: Ames test
System of testing: S.typhimurium TA98,100
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium–propionate

(125)

Type: Ames test
System of testing: S.typhimurium TA 92,94,98,100,1535,1537
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: –5mg/plate
Table not readable, but result "negative" is assumed.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(100) (126) (127)

Type: Ames test
System of testing: S.typhimurium TA 92,94,98,100,1535,1537
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: –10mg/plate.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(100) (126)

Type: Ames test
System of testing: S.typhimurium TA 98,100,1535,1537,1538
Concentration: 0,095% (0,95 mg/ml)
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: S9 from rat, mouse and hamster.
Plate- and suspensiontest
Source: BASF AG Ludwigshafen
(100) (48) (128)

Type: Ames test
System of testing: S.typhimurium TA98,100,1353,1357
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: 0,01-10ul/plate.
Source: BASF AG Ludwigshafen
(100) (129)

Type: Ames test
System of testing: S.typhimurium TA 98, 100, 1535, 1537, 1538
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(130)

Type: Ames test
System of testing: S.typhimurium TA98,100
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium-propionate
(131)

Type: Ames test
System of testing: S.typhimurium TA 92,94,98,100,1535,1537
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: -5mg/plate
Table not readable, but result "negative" is assumed.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(58) (126) (127)

Type: Ames test
System of testing: S.typhimurium TA 92,94,98,100,1535,1537
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: -10mg/plate.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(58) (126)

Type: Ames test
System of testing: S.typhimurium TA 98,100,1535,1537,1538
Concentration: 0,095% (0,95 mg/ml)
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: S9 from rat, mouse and hamster.
Plate- and suspensiontest
Source: BASF AG Ludwigshafen

(58) (48) (128)

Type: Ames test
System of testing: S.typhimurium TA98,100,1353,1357
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: 0,01-10ul/plate.
Source: BASF AG Ludwigshafen
(58) (132)

Type: Cytogenetic assay
System of testing: CHL cells
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(125) (133)

Type: Cytogenetic assay
System of testing: CHL-cells
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: -2mg/ml.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(100) (126) (127)

Type: Cytogenetic assay
System of testing: CHL-cells
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: -2mg/ml.
slight increase of aberrations in highest concentration, no effect at 1mg/ml.
Source: BASF AG Ludwigshafen

Test substance: Calcium propionate (100) (126)

Type: Cytogenetic assay
System of testing: Human WI38 cells
Concentration: 0,4; 4; 40 mg/l
Metabolic activation:
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionate (134)

Type: Cytogenetic assay
System of testing: CHL cells
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate (131) (133)

Type: Cytogenetic assay
System of testing: CHL–cells
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: –2mg/ml.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate (58) (126) (127)

Type: Cytogenetic assay
System of testing: CHL–cells
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: –2mg/ml.
slight increase of aberrations in highest concentration, no effect at 1mg/ml.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(58) (126)

Type: Cytogenetic assay
System of testing: Human WI38 cells
Concentration: 0,4; 4; 40 mg/l
Metabolic activation:
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calciumpropionate

(135)

Type: DNA damage and repair assay
System of testing: Bac.subtilis
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(125)

Type: DNA damage and repair assay
System of testing: E.coli WP2, WP67(uvrA-,polA-) und CM871(uvrA-,recA-,lexA-)
Concentration:
Metabolic activation: without
Result:
Method:
Year: **GLP:**
Test substance:
Remark: Dose: 1, 5 and 25ul.
Inhibition of strains WP67 and CM871 stronger than WP2.
Result is not evaluated by the author.
Source: BASF AG Ludwigshafen
(100) (129)

Type: DNA damage and repair assay
System of testing: Bac.subtilis
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(131)

Type: DNA damage and repair assay
System of testing: E.coli WP2, WP67(uvrA-,polA-) und CM871(uvrA-,recA-,lexA-)
Concentration:
Metabolic activation: without
Result:
Method:
Year: **GLP:**
Test substance:
Remark: Dose: 1, 5 and 25ul.
Inhibition of strains WP67 and CM871 stronger than WP2.
Result is not evaluated by the author.
Source: BASF AG Ludwigshafen
(58) (132)

Type: Sister chromatid exchange assay
System of testing: V79 cells
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: 0,1-33mM.
Source: BASF AG Ludwigshafen
(100) (129)

Type: Sister chromatid exchange assay
System of testing: V79 cells
Concentration:
Metabolic activation: no data
Result:
Method:
Year: **GLP:**
Test substance:
Remark: Slightly elevated SCE. Negative control in comparison to Sodium butyrate. No further information.
Source: BASF AG Ludwigshafen
(136)

Type: Sister chromatid exchange assay
System of testing: human lymphocytes
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: slightly increase in SCE at 2.5 mM is described. According to the authors this weak SCE induction may be related to altered culture conditions. Some carboxylic acids were studied and the maximum response was, at most, 1.8 times (crotonic acid). For propionic acid the response was about 1.2 times. In contrast to the authors the result should be judged as negative.
Source: BASF AG Ludwigshafen
(137)

Type: Sister chromatid exchange assay
System of testing: V79 cells
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: 0,1-33mM.
Source: BASF AG Ludwigshafen
(58) (132)

Type: other: DNA repair recassay
System of testing: Bac.subtilis H17(rec+), M45(rec-)
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: paper disk method
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(130)

Type: other: E.coli reverse mutation assay
System of testing: E.coli WP2 hcr trp
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(130)

Type: other: Gene conversion assay
System of testing: Sac. cerevisiae D4
Concentration: 2,5% 25 mg/ml
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen
(100) (48) (128)

Type: other: Gene conversion assay
System of testing: Sac. cerevisiae D4
Concentration: 2,5% 25 mg/ml
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Source: BASF AG Ludwigshafen
(58) (48) (128)

Type: other: Micronucleus Test
System of testing: Tradescantia paludosa clone 03
Concentration: 0,25-1%
Metabolic activation: without
Result: ambiguous
Method:
Year: **GLP:**
Test substance:
Remark: Increase of the number of micronuclei in highest concentration.
Source: BASF AG Ludwigshafen
(138)

Type: other: Micronucleus Test
System of testing: Tradescantia paludosa clone 03
Concentration: 0,2-1 mM
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(138)

Type: other: Punktmutation
System of testing: silkworm
Concentration:
Metabolic activation:
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(125)

Type: other: Punktmutation
System of testing: silkworm
Concentration:
Metabolic activation:
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(131)

Type: other: SOS-Chromotest
System of testing: E.coli PQ37
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: 0,01-10mM.
Source: BASF AG Ludwigshafen

(100) (129)

Type: other: SOS-Chromotest
System of testing: E.coli PQ37
Concentration:
Metabolic activation: with and without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: 0,01-10mM.
Source: BASF AG Ludwigshafen

(58) (132)

Type: other
System of testing: E.coli PQ37
Concentration: 0,3-33,3 mM
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: Toxicity at 10 and 33,3mM.
Source: BASF AG Ludwigshafen

(139)

Type: other
System of testing: E.coli Sd4-73
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance:
Remark: Reversion from streptomycin dependence to independence. Paper disk method.
Source: BASF AG Ludwigshafen

(140)

Type: other
System of testing: E. coli PQ37
Concentration:
Metabolic activation:
Result:
Method:
Year: **GLP:**
Test substance: other TS
Remark: Induction of SOS function by UV irradiation was not inhibited by calcium propionate up to 500ug/l.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(141)

Type: other
System of testing: Bac.subtilis H17(rec+),M45(rec-)
Concentration:
Metabolic activation: without
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Remark: 50ul of 1% solution on paper disk
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(142)

Type: other
System of testing: S.typhimurium G46 and TA1530, Sacch.cerevisiae D3
Concentration:
Metabolic activation:
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(134)

Type: other
System of testing: S.typhimurium G46 and TA1530, Sacch.cerevisiae D3
Concentration:
Metabolic activation:
Result: negative
Method:
Year: **GLP:**
Test substance: other TS
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(135)

5.6 Genetic Toxicity 'in Vivo'

Type: Cytogenetic assay
Species: rat **Sex:**
Strain:
Route of admin.:
Exposure period:
Doses:
Result:
Method:
Year: **GLP:**
Test substance: other TS
Remark: bone marrow, no further details
Result: negativ
Sodium-propionate, bone marrow, no further details
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(143)

Type: Cytogenetic assay
Species: rat **Sex:**
Strain:
Route of admin.: oral unspecified
Exposure period: Single dose and five doses
Doses: 50, 500, 5000mg/kg
Result:
Method:
Year: **GLP:**
Test substance: other TS
Result: No increase of chromosome aberrations in bone marrow cells
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(135)

Type: Cytogenetic assay
Species: rat **Sex:**
Strain:
Route of admin.:
Exposure period:
Doses:
Result:
Method:
Year: **GLP:**
Test substance: other TS
Remark: bone marrow, no further details
Result: negativ
Sodium-propionate, bone marrow, no further details
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(131)

Type: Dominant lethal assay
Species: rat **Sex:**
Strain:
Route of admin.: oral unspecified
Exposure period: Single dose
Doses: 50, 500, 5000mg/kg
Result:
Method:
Year: **GLP:**
Test substance: other TS
Result: No dominant lethal mutations detected
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(135)

Type: Micronucleus assay
Species: Chinese hamster **Sex:** male/female
Strain:
Route of admin.: i.p.
Exposure period: once
Doses: 5ml 2,5% propionic acid/kg b.w. (=125mg/kg)
Result:
Method:
Year: **GLP:**
Test substance:
Result: Chinese hamster. 6 animals/sex. Sacrifice intervals 12, 24 and 48h p.inj.. Toxicity: 4/36 died.
No increase in number of micronuclei.
Source: BASF AG Ludwigshafen
(100) (129)

Type: Micronucleus assay
Species: Chinese hamster **Sex:** male/female
Strain:
Route of admin.: i.p.
Exposure period: once
Doses: 5ml 2,5% propionic acid/kg b.w. (=125mg/kg)
Result:
Method:
Year: **GLP:**
Test substance:
Result: Chinese hamster. 6 animals/sex. Sacrifice intervals 12, 24 and 48h p.inj.. Toxicity: 4/36 died.
No increase in number of micronuclei.
Source: BASF AG Ludwigshafen
(58) (132)

Type: other: Host mediated assay
Species: mouse **Sex:**
Strain:
Route of admin.: oral unspecified
Exposure period: Single dose and five doses
Doses: 50, 500, 5000mg/kg
Result:
Method:
Year: **GLP:**
Test substance: other TS
Result: Increase in reversion frequency of S.typhimurium G-46 but not dose related. No mutations in strain TA1530 and Saccharomyces cerevisiae D3.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate
(135)

5.7 Carcinogenicity

Species: rat **Sex:** male
Strain: other: Wistar (Han-BGA)
Route of admin.: oral feed
Exposure period: 10 animals/group 25 weeks; 20 animals/group until end of life
Frequency of treatment: daily
Post. obs. period: no
Doses: 0,4; 4% (4000; 40000ppm = 264; 2640mg/kg b.w.)
Result:
Control Group: yes
Method: other
Year: **GLP:** no
Test substance: other TS
Result: 25 weeks and 4%: hyperkeratotic and -plastic changes of forestomach mucosa, especially at the limiting ridge, 6/10 epidermal hyperplasia with beginning ulceration or papilloma formation, erosive lesions in the glandular stomach.
25 weeks and 0,4%: hyperkeratosis, hyperplasia of limiting ridge. Lifetime groups:
Survival: Control 125+/-30 weeks, 0,4% 122+/-29 weeks, 4% 121+/- 31 weeks.
Effects 4%: 17/20 papillomas partly with horny pearls or cysts, described as precancerous lesions in 5 animals. Strong mucosal hyperplasia of forestomach. 19/20 dysplasia of glanular stomach mucosa (13 multiple), 1/20 Cyst in the pyloroduodenal region, 1/20 adenomalike dysplasial proliferation in pyloric region, 1/20 fibroma and leiomyoma of jejunum. Effects 0,4%: hyperkeratosis and slight hyperplasia of limiting ridge, 10/20 proliferation of basal cells, 13/20 dysplasia of glandular stomach, 1/20 adenocarcinoma of pyloric region, 1/20 cyst in region of Brunners gland and adenomalike dysplasial proliferation in pyloric region. Control: 5/20 dysplasia of glandular stomach.
Source: BASF AG Ludwigshafen
Test substance: Propionsaeure und ihre Salze

(144) (100) (145)

Species: rat **Sex:** male
Strain: other: Wistar (Han-BGA)
Route of admin.: oral feed
Exposure period: 10 animals/group 25 weeks; 20 animals/group until end of life
Frequency of treatment: daily
Post. obs. period: no
Doses: 0,4; 4% (4000; 40000ppm = 264; 2640mg/kg b.w.)
Result:
Control Group: yes
Method: other
Year: **GLP:** no
Test substance: other TS
Result: 25 weeks and 4%: hyperkeratotic and -plastic changes of forestomach mucosa, especially at the limiting ridge, 6/10 epidermal hyperplasia with beginning ulceration or papilloma formation, erosive lesions in the glandular stomach.
25 weeks and 0,4%: hyperkeratosis, hyperplasia of limiting ridge. Lifetime groups:
Survival: Control 125+/-30 weeks, 0,4% 122+/-29 weeks, 4% 121+/- 31 weeks.
Effects 4%: 17/20 papillomas partly with horny pearls or cysts, described as precancerous lesions in 5 animals. Strong mucosal hyperplasia of forestomach. 19/20 dysplasia of glanular stomach mucosa (13 multiple), 1/20 Cyst in the pyloroduodenal region, 1/20 adenomalike dysplasial proliferation in pyloric region, 1/20 fibroma and leiomyoma of jejunum. Effects 0,4%: hyperkeratosis and slight hyperplasia of limiting ridge, 10/20 proliferation of basal cells, 13/20 dysplasia of glandular stomach, 1/20 adenocarcinoma of pyloric region, 1/20 cyst in region of Brunners gland and adenomalike dysplasial proliferation in pyloric region. Control: 5/20 dysplasia of glandular stomach.
Source: BASF AG Ludwigshafen
Test substance: Propionsaeure und ihre Salze

(58) (109) (145)

Species: rat **Sex:** male
Strain: Fischer 344
Route of admin.: other: keine Angabe
Exposure period: 6 Wochen
Frequency of treatment:
Post. obs. period:
Doses: keine Angabe
Result:
Control Group:
Method:
Year: **GLP:**
Test substance: other TS
Remark: The original article from Ito et al.: Carcinogenesis 9, 387-394 (1988) contains no data on sodium propionate.
Result: In this review article on a standardized protocol for a medium term bioassay model for carcinogenesis with DEN

initiation and partial hepatectomy sodium propionate occures in a list of chemicals with positive results.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(146)

5.8 Toxicity to Reproduction

-

5.9 Developmental Toxicity/Teratogenicity

Species: rat **Sex:**
Strain: Wistar
Route of admin.: oral unspecified
Exposure period: 10 days, days 6-15
Frequency of treatment: daily
Duration of test:
Doses: 3, 14, 65, 300mg/kg
Control Group: other: sham treated
Method:
Year: **GLP:**
Test substance: other TS
Result: No maternal or fetal abnormalities detected.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(147)

Species: mouse **Sex:**
Strain: CD-1
Route of admin.: oral unspecified
Exposure period: 10 days, days 6-15
Frequency of treatment: daily
Duration of test:
Doses: 3, 14, 65, 300mg/kg
Control Group: other: sham treated
Method:
Year: **GLP:**
Test substance: other TS
Result: No maternal or fetal abnormalities detected.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(147)

Species: rabbit **Sex:**
Strain: other: Hollaender
Route of admin.: oral unspecified
Exposure period: 13 days, days 6-18
Frequency of treatment: daily
Duration of test:
Doses: 4, 19, 86, 400mg/kg
Control Group: other: sham treated
Method:
Year: **GLP:**
Test substance: other TS
Result: No maternal or fetal abnormalities detected.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(147)

Species: hamster **Sex:**
Strain:
Route of admin.: oral unspecified
Exposure period: 5 days, days 6-10
Frequency of treatment: daily
Duration of test:
Doses: 4, 19, 86, 400mg/kg
Control Group: other: sham treated
Method:
Year: **GLP:**
Test substance: other TS
Result: No maternal or fetal abnormalities detected.
Source: BASF AG Ludwigshafen
Test substance: Calcium propionate

(147)

Species: **Sex:**
Strain:
Route of admin.: other: Injection
Exposure period:
Frequency of treatment:
Duration of test:
Doses: 10 mg/egg
Control Group:
Method:
Year: **GLP:**
Test substance: other TS
Result: Injection of up to 10mg/egg into air cell or yolc sac of preincubation or 96h incubated hen eggs resulted in LD50 values between 3,2 and 6,7mg/egg. There was a dose dependent increase in abnormalities after injection into the air cell but not after treatment via the yolc sac.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate

(148)

5.10 Other Relevant Information

Type: Cytotoxicity
Remark: erythroleucemic cells
Propionic acid induces erythroid differentiation of the cells at 1-2mM concentrations. Butyric acid is much more effective.
Source: BASF AG Ludwigshafen
(149)

Type: Cytotoxicity
Remark: colonic epithelial cells
Primary cultures of human epithelial cells from colon biopsies from patients with high risk of colon cancer were treated with psyllium fiber or short chain fatty acids. Propionic acid from 2-10mM decreased the number of viable cells to 45% and from 10-15mM increased the H3-Thymidine labeling index of the surviving cells to 120-140% of the control value.
Source: BASF AG Ludwigshafen
(150)

Type: Cytotoxicity
Remark: Lymphcytes
Mitogen induced proliferation of cultured lymphocytes is reversibly inhibited by propionic acid (1-10mM) without cytotoxicity (survival measured by trypan blue). Butyric acid is the most potent substance out of several short chain fatty acids.
Source: BASF AG Ludwigshafen
(151)

Type: Cytotoxicity
Remark: Yeast
Minimum inhibitory concentration in different yeast species (adapted to benzoic acid) at pH 3,5 was 2,5-13,5g/l. The inhibitory effect was not due to the pH.
Source: BASF AG Ludwigshafen
(152)

Type: Cytotoxicity
Remark: hum.leukemic lymphoblasts
CCRF-CEM cells.
After incubation in 5mM concentration the following ranking of cytotoxicity was established for short chain fatty acids by cell counting, H3-Thymidine incorporation and C14-release:
n-butyrate>propionate=n-valerate>i-butyrate>>acetate.
Source: BASF AG Ludwigshafen
(153)

Type: Cytotoxicity
Remark: HepG2 cells
PI50 = concentration which produces 50% reduction of protein content = 45mM
Source: BASF AG Ludwigshafen
(154)

Type: Cytotoxicity
Remark: colonic epithelial cells
Primary cultures of human epithelial cells from colon biopsies from patients with high risk of colon cancer were treated with psyllium fiber or short chain fatty acids. Propionic acid from 2-10mM decreased the number of viable cells to 45% and from 10-15mM increased the H3-Thymidine labeling index of the surviving cells to 120-140% of the control value.
Source: BASF AG Ludwigshafen
(150)

Type: Cytotoxicity
Remark: Lymphcytes
Mitogen induced proliferation of cultured lymphocytes is reversibly inhibited by propionic acid (1-10mM) without cytotoxicity (survival measured by trypan blue). Butyric acid is the most potent substance out of several short chain fatty acids.
Source: BASF AG Ludwigshafen
(151)

Type: Cytotoxicity
Remark: Yeast
Minimum inhibitory concentration in different yeast species (adapted to benzoic acid) at pH 3,5 was 2,5-13,5g/l. The inhibitory effect was not due to the pH.
Source: BASF AG Ludwigshafen
(152)

Type: Cytotoxicity
Remark: hum.leukemic lymphoblasts
CCRF-CEM cells.
After incubation in 5mM concentration the following ranking of cytotoxicity was established for short chain fatty acids by cell counting, H3-Thymidine incorporation and C14-release:
n-butyrate>propionate=n-valerate>i-butyrate>>acetate.
Source: BASF AG Ludwigshafen
(155)

Type: Cytotoxicity
Remark: HepG2 cells
PI50 = concentration which produces 50% reduction of protein content = 45mM
Source: BASF AG Ludwigshafen
(156)

Type: Metabolism
Remark: Summary of literature upto 1958.
Propionic acid is metabolized in mammals rapidly and entirely, the main pathway being from propionyl-CoA via Methylmalonyl-CoA after incorporation of CO2 to succinate, which is member of citric acid cycle. Minor pathways may be condensation of acetyl- and propionyl-CoA to form beta-Ketovalerianyl-CoA or metabolism to beta-alanine.
Source: BASF AG Ludwigshafen
(77)

Type: Metabolism
Remark: Summary of literature upto 1958.
Propionic acid is a natural intermediate in metabolism of odd- numbered fatty acids and amino acids (valine, isoleucine, threonine). 0-5% of volatile fatty acids in blood (0,18- 1,6mmol/l) are propionic acid. From in vitro studies metabolic rates up to 4,5g propionic acid/h for the liver of a 70kg man could be estimated.
Source: BASF AG Ludwigshafen
(77)

Type: Metabolism
Remark: Liver cell culture
Liver cell cultures of B12 deficient rats excert a decrease of propionate metabolism (1mM) to glucose or CO2. Addition of carnitin (10mM) increases the production of propionylcarnitin (10- ad fold) without altering the above pathway. Intraperitoneal administration of carnitin increases the urinary excretion of propionylcarnitin in Vit.B12 deficient rats.
Source: BASF AG Ludwigshafen
(157)

Type: Metabolism
Remark: rabbit
Oral administration (gavage) of 1000 or 3000mg/kg did not reduce acetonuria in alloxan diabetic rabbits but was lethal to 3/9 in the high dose. This was not the case in normal animals. 10mMol/kg (970mg/kg) produced no elevation in excretion of total short chain fatty acids but a shift towards excretion of acetic acid. In diabetic animals this treatment produced an increase in urinary excretion of ketone bodies, short chain fatty acid (acetic and butyric) and glucose. Propionic acid was not excreted.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(158)

Type: Metabolism
Remark: Summary of literature upto 1958.
Propionic acid is metabolized in mammals rapidly and entirely, the main pathway being from propionyl-CoA via Methylmalonyl-CoA after incorporation of CO2 to succinate, which is member of citric acid cycle. Minor pathways may be condensation of acetyl- and propionyl-CoA to form beta-Ketovalerianyl-CoA or metabolism to beta-alanine.

Source: BASF AG Ludwigshafen
(78)

Type: Metabolism
Remark: Summary of literature upto 1958.
Propionic acid is a natural intermediate in metabolism of odd- numbered fatty acids and amino acids (valine, isoleucine, threonine). 0-5% of volatile fatty acids in blood (0,18- 1,6mmol/l) are propionic acid. From in vitro studies metabolic rates up to 4,5g propionic acid/h for the liver of a 70kg man could be estimated.
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Remark: rabbit
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Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(158)

Type: Neurotoxicity
Remark: Ratte
1 ul injection of 120mM propionic acid solution into the dorsal hippocampus of anesthetized adult Spraque-Dawley rats (total amount = 8,88ug) did not induce histologically detectable neurotoxic brain lesions.
Source: BASF AG Ludwigshafen
(160)

Type: Toxicokinetics
Remark: rat
Vitamin B12 deficiency produced by soy bean diets led to an increase in urinary excretion of radioactivity from intraperitoneally injected H3-propionic acid. Parenteral supplementation of vit.B12 (3 doses of 5ug in 4weeks) turned excretion to normal.

Source: BASF AG Ludwigshafen
(104)

Type: other: Carrier–mediated transport of monocarboxylic acids in primary cultured epithelial cells from rabbit oral mucosa
Source: BASF AG Ludwigshafen
(161)

Type: other: Developmental toxicity of carboxylic acids to Xenopus embryos: A quantitative structure–activity relationship and computer–automated structure evaluation
Source: BASF AG Ludwigshafen
(162)

Type: other: Human data
Remark: case study

Daily doses of 6g in an adult showed no toxic effect. A sligt alkalinisation of urine occured.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(77) (88)

Type: other: Human data
Remark: clinical exp./ sensitization

chronic topical use of 10% sodium propionate solution in clinical trials did not result in sensitization but proved to be hypoallergenic.
The substance showed local antihistaminic effects.
Source: BASF AG Ludwigshafen
Test substance: sodium propionate
(163) (88)

Type: other: Human data
Remark: eye/mucosal irritation/human

10% solution, pH 7,2, not irritant, slight transient stinging to the conjunctiva and nasal mucosa.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(88)

Type: other: Human data
Remark: skin irritation/human

20% solution, pH 7–8,5 not irritant.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(88)

Type: other: Human data
Remark: skin irritation/human
Sodium propionate powder not irritating in clinical use.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(164)

Type: other: Human data
Remark: case study

Daily doses of 6g in an adult showed no toxic effect. A sligt alkalinisation of urine occured.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(78) (88)

Type: other: Human data
Remark: clinical exp./ sensitization

chronic topical use of 10% sodium propionate solution in clinical trials did not result in sensitization but proved to be hypoallergenic.
The substance showed local antihistaminic effects.
Source: BASF AG Ludwigshafen
Test substance: sodium propionate
(163) (88)

Type: other: Human data
Remark: eye/mucosal irritation/human

10% solution, pH 7,2, not irritant, slight transient stinging to the conjunctiva and nasal mucosa.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(88)

Type: other: Human data
Remark: skin irritation/human

20% solution, pH 7-8,5 not irritant.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(88)

Type: other: Human data
Remark: skin irritation/human
Sodium propionate powder not irritating in clinical use.
Source: BASF AG Ludwigshafen
Test substance: Sodium propionate
(60)

Type: other: Quantitative structure-activity relationships (QSARs) for skin corrosivity of organic acids, bases and phenols: Principal components and neural network analysis of extended datasets
Source: BASF AG Ludwigshafen
(165)

Type: other: Review
Remark: Zusammenfassende Darstellungen
Source: BASF AG Ludwigshafen
(166) (167) (168) (169) (170) (171) (172) (52) (164) (173) (106) (127) (174) (175) (176) (177) (61)

Type: other: Review
Remark: Zusammenfassende Darstellungen
Source: BASF AG Ludwigshafen
(166) (58) (109) (169) (178) (179) (180) (52) (60) (173) (106) (127) (174) (175) (176) (177) (61)

Type: other: Review
Source: BASF AG Ludwigshafen
(181)

Type: other: Review
Source: BASF AG Ludwigshafen
(182)

Type: other: Review
Source: BASF AG Ludwigshafen
(183)

Type: other: Skin corrosivity potential of fatty acids: In vitro rat and human skin testing and QSAR studies
Source: BASF AG Ludwigshafen
(184)

Type: other: The study of induced antimutagenesis of propionic acid bacteria
Source: BASF AG Ludwigshafen
(185)

Type: other: The use of in vitro cytotoxicity measurements in QSAR methods for the prediction of the skin corrosivity potential of acids
Source: BASF AG Ludwigshafen
(186)

Type:
Remark: Narcotic effects; Rat
ED50 of 1,0m solution of sodium propionate 2800mg/kg i.p. with duration of narcosis 4-30min.
0,5m solution was not effective, ED50 i.v. about 1/10 of dose, s.c. weaker action, oral no narcotic effect, no influence of
Source: BASF AG Ludwigshafen
(77)

Type:
Remark: Narcotic effects; Rat
ED50 of 1,0m solution of sodium propionate 2800mg/kg i.p. with duration of narcosis 4-30min.
0,5m solution was not effective, ED50 i.v. about 1/10 of dose, s.c. weaker action, oral no narcotic effect, no influence of
Source: BASF AG Ludwigshafen

(78)

5.11 Experience with Human Exposure

Remark: Akute Einwirkungen von Propionsaeure fuehrte bei Arbeitern zu leichten bis mittleren hautreizungen, leichten Augenreizungen und in einem Fall zu Husten und asthmatischen Beschwerden. 8 h-Konzentrationen < 0.25 ppm mit Spitzen bis zu 2.1 ppm fuehrten zu keinen Reizungen.
Source: BASF AG Ludwigshafen

(187)

Remark: 15 %-ige Loesungen von Na-Propionat rufen an der menschlichen Konjunktiva nur eine voruebergehende Roetung mit Brennen hervor, 5 %-ige Loesungen, speziell im ph-Bereich von 7-8.5, erzeugen keinerlei Reizsymptome.
Source: BASF AG Ludwigshafen

(188)

Remark: Bei einstuendiger Einwirkung von Propionsaeure nach 40 Minuten Hauterythem mit Schmerzen und geringfuegiger Nekrose nach 1 Stunde.
Source: BASF AG Ludwigshafen

(189)

Remark: Orale Gabe von 6 g Na-Propionat fuehrte zur Alkalisierung des Harns. Nebenwirkungen wurden keine beobachtet.
Source: BASF AG Ludwigshafen

(190)

Remark: Die Behandlung mit L-Carnitin fuehrte zur verstaerkten Bildung und Ausscheidung von Propionylcarnitin bei drei Patienten mit Propionsaeure-Azidaemie.
Source: BASF AG Ludwigshafen

(191)

Remark: Fallbericht ueber zwei schwangere Frauen, eine davon mit leichter Propionsaeure-Azidaemie, die unter eiweissreduzierter Diaet und Carnitingabe gesunde Kinder und ohne metabolische Dekompensation zur Welt brachten.
Source: BASF AG Ludwigshafen

(192)

Remark: Erhoehte SCEs in kultivierten Humanlymphozyten bei 2.5 mM.
Source: BASF AG Ludwigshafen

(193)

Remark: 15 %-ige Loesungen von Na-Propionat rufen an der menschlichen Konjunktiva nur eine voruebergehende Roetung mit Brennen hervor, 5 %-ige Loesungen, speziell im ph-Bereich von 7-8.5, erzeugen keinerlei Reizsymptome.
Source: BASF AG Ludwigshafen
(188)

Remark: Bei einstuendiger Einwirkung von Propionsaeure nach 40 Minuten Hauterythem mit Schmerzen und geringfuegiger Nekrose nach 1 Stunde.
Source: BASF AG Ludwigshafen
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Remark: Orale Gabe von 6 g Na-Propionat fuehrte zur Alkalisierung des Harns. Nebenwirkungen wurden keine beobachtet.
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Remark: Die Behandlung mit L-Carnitin fuehrte zur verstaerkten Bildung und Ausscheidung von Propionylcarnitin bei drei Patienten mit Propionsaeure-Azidaemie.
Source: BASF AG Ludwigshafen
(191)

Remark: Fallbericht ueber zwei schwangere Frauen, eine davon mit leichter Propionsaeure-Azidaemie, die unter eiweissreduzierter Diaet und Carnitingabe gesunde Kinder und ohne metabolische Dekompensation zur Welt brachten.
Source: BASF AG Ludwigshafen
(192)

Remark: Erhoehte SCEs in kultivierten Humanlymphozyten bei 2.5 mM.
Source: BASF AG Ludwigshafen
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7.1 Risk Assessment

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1. General Information

Id 4075-81-4
Date December 20, 2002

201-15593B1

Note: Appendix I refers to the IUCLID profile for Propionic acid

1.0 SUBSTANCE INFORMATION

Generic Name	:	Propionic acid, calcium salt
Chemical Name	:	Propionic acid, calcium salt
CAS Registry No.	:	4075-81-4
Component Cas Nos.	:	
EINECS No.	:	223-795-8
Structural Formula	:	$C_6H_{10}CaO_4$
Molecular Weight	:	186.2226
Synonyms and Tradenames	:	Calcium dipropionate; calcium propionate; calcium propanoate; propanoic acid, calcium salt; Bioban-C; Luprosil Spezial; Mycoban
Reference	:	http://www.chemfinder.com; MSDS dated 6/6/01 prepared by Kemin Industries, Ltd.; MSDS as cited in IUCLID (2000). IUCLID Dataset. European Chemicals Bureau, European Commission. Dataset for Calcium Dipropionate, 2/18/2000. [Subsequently referenced as IUCLID (2000)]

2.1 MELTING POINT

Type	:	
Guideline/method	:	OECD 103
Value	:	Could not be determined under the test conditions
Decomposition	:	
Sublimation	:	
Year	:	2003
GLP	:	yes
Test substance	:	Propionic acid, calcium salt
Method	:	Thermal Analysis and Capillary Test
Method detail	:	Thermal analysis was conducted using a Differential Scanning Calorimeter using a range of 25°C to 400°C with a change of 20 K/min. The capillary test was conducted using a Buechi Melting Point Tester, B-545. Samples were heated over a range of 25°C to 400°C
Remark	:	**Supporting data for dissocation products:** **Acid:** Melting point for propionic acid is reported to be 22.4°C (See Appendix I: 2.1)
Result	:	During Thermal Analysis endothermic peaks were observed starting at 90°C, a second, small peak at 260°C, and third peak at 360°C the remaining brown residue at the end of the study was half melted. In the Capillary Test the material was unchanged up to 360°C, but above 360°C the material began to sweat and at about 390°C the material started to melt and the color changed to a brown-grey.
Reliability	:	[1] Recent GLP Guideline Study
Reference	:	

2.2 BOILING POINT

Type	:	
Guideline/method	:	
Value	:	Not applicable.
Decomposition	:	
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	**Supporting data for dissocation products:** **Acid:** Boiling point for propionic acid is reported to be 140.7 – 141.6°C (See Appendix I: 2.2)
Remark	:	
Reliability	:	
Reference	:	MSDS dated 6/4/01, prepared by Kemin Industries, Inc.

2.3 DENSITY

Type	:	Bulk density
Guideline/method	:	
Value	:	ca. 400 kg/m^3 at °C
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	

Result	:	
Remark	:	**Supporting data for dissocation products:** **Acid:** Density for propionic acid is reported to be 0.992 g/cm^3 at 20°C (See Appendix I: 2.3)
Reliability	:	[4] Not assignable. Only secondary reference
Reference	:	MSDS as cited in IUCLID (2000)

2.4 VAPOR PRESSURE

Type	:	
Guideline/method	:	
Value	:	Not applicable
Decomposition	:	
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissocation products:** **Acid:** Vapor pressure for propionic acid reported to be 5 hPa at 20°C (See Appendix I: 2.4)
Reliability	:	
Reference	:	MSDS dated 6/4/01, prepared by Kemin Industries, Inc.

2.5 PARTITION COEFFICIENT

Type	:	
Guideline/method	:	
Partition coefficient	:	
Log Pow	:	at °C
pH value	:	
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissocation products:** **Acid:** Log Pow for propionic acid reported to be 0.25 – 0.33 (See Appendix I: 2.5)
Reliability	:	
Reference	:	

2.6.1 SOLUBILITY IN WATER

Type	:	
Guideline/method		
Value	:	260 g/L at 20°C
pH value	:	9.2
concentration	:	200 g/L at 20 °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at °C
Description	:	

Stable	:	
Deg. product	:	
Year	:	
GLP	:	
Test substance	:	
Deg. products CAS#	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	Other reported values: 49 g/100 mL at 0°C; 55.8 g/100 mL at 100°C (Hazardous Substances Data Bank, online at http://toxnet.nlm.nih.gov;) [Subequently referred to as HSDB, 2002]
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	MSDS as cited in IUCLID (2000)

2.7 FLASH POINT

Type	:	
Guideline/method	:	
Value	:	Not applicable
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissocation products:** **Acid:** Flash point for propionic acid reported to be 52.3°C (See Appendix I: 2.7)
Reliability	:	
Reference	:	MSDS, Fisher Scientific (2002) from http://www.fishersci.ca/msds/nsf

3.1.1 PHOTODEGRADATION

Type	:	
Guideline/method	:	
Light source	:	
Light spectrum	:	
Relative intensity	:	based on
Spectrum of substance	:	lambda (max, >295nm) epsilon (max) epsilon (295)
Conc. of substance	:	at °C
DIRECT PHOTOLYSIS		
Halflife (t1/2)	:	
Degradation	:	% after
Quantum yield	:	
INDIRECT PHOTOLYSIS		
Sensitizer	:	
Conc. of sensitizer	:	
Rate constant	:	
Degradation	:	
Deg. product	:	
Year	:	
GLP	:	
Test substance	:	
Deg. products CAS#	:	
Method	:	
Method detail	:	
Result	:	1.22 - 1.60 E-12 cm^3/mol/s at 298ºK (measured for free acid)
Remark	:	**Supporting data for dissocation products:** **Acid:** The calculated time to 50% degradation by indirect photolysis of propionic acid was 4.7 years at room temperature and a pH of 9 with a rate constant of 0.47 x 10^9 L/mol.sec (See Appendix I: 3.1.1)
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	Atkinson, R., J. Phys. Chem. RefData, Mongraph 1; Meylan, W. and P. Howard, 1993, Atmospheric Oxidation Program Ver. 1.5, Syracuse Research Corp., NY; As cited in IUCLID (2000)

3.1.2 DISSOCIATION

Type	:	Dissociation constant determination
Guideline/method	:	OECD 112
pKb	:	6.76 and 4.75 at 20°C
Year	:	2002
GLP	:	Yes
Test substance	:	Calcium propionate (3445-1), lot number 05322JU, received from Aldrich Chemical Company. White powder, purity of 21.2% calcium
Approximate water solubility	:	Greater than 10,000 mg/L as determined visually in preliminary study
Method	:	OECD Guideline 112, Dissociation Constants in Water

Method detail	:	Three replicate samples of calcium propionate were prepared at a nominal concentration of 0.01 moles/L by dissolving 0.186 grams of test substance in 100 mL of degassed water (ASTM Type II). Each sample was titrated against 0.1 N hydrochloric acid while maintained at a test temperature of 20±1°C. At least 4 incremental additions were made before the first equivalence point and at least 10 incremental additions were made before the second equivalence point. The titration was carried past the final equivalence point. Values of pK were calculated for a minimum of 4 points on the titration curve. Phosphoric acid and 4-nitrophenol were used as reference substances.
Result	:	Mean (N = 3) pKb values were 6.76 (SD = 0.0488) and 4.75 (SD= 0.00808) at 20°C
Remark	:	The results indicate that dissociation of the test substance will occur at environmentally-relevant pH values (approximately neutral) and at physiologically-relevant pH values (approximately 1.2).
Reliability	:	[1] Reliable without restriction.
Reference	:	Lezotte, F.J. and W.B. Nixon, 2002. Determination of the dissociation constant of proprionic acid, calcium salt, Wildlife International, Ltd. Study No. 534C-120, conducted for the Metal Carboxylates Coalition.

3.2.1 MONITORING DATA

Type of measurement	:	
Media	:	Food
Concentration	:	ca. 2000 mg/l
Substance measured	:	
Method	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	Propionic acid, calcium salt is widely used as a mold and rope inhibitor in bread and bakery products at levels approx. 2000 ppm. Also used to prevent mold in certain cheeses and on certain fruit and vegetable products. (IUCLID, 2000). Weighted mean concentration added to baked goods 1100 ppm (FASEB, 1979)
Reliability	:	[1] Reliable without restriction
Reference	:	IUCLID (2000); Federation of American Societies for Experimental Biology (FASEB), Evaluation of the health aspects of propionic acid, calcium propionate, sodium propionate, dilauryl thiodipropionate, and thiodipropionic acid as food ingredients, Report of Select Committee on GRAS substances, prepared for US Food and Drug Administration, 1979. PB80104599 [Subequently referred to as FASEB, 1979]

Additional information: According to the Joint FAO/WHO Expert Committee on Food Additives, the estimate of the acceptable daily intakes for man are given as 0 – 10 mg/kg body weight (unconditional acceptance) and 10 – 20 mg/kg body weight (conditional acceptance). This is calculated as the sum of propionic acid, calcium propionate and sodium propionate. The Expert Commitee stated that there is no reason to believe that propionic acid differs toxicologically from its calcium and sodium salts. (FAO Nutrition Meetings, Report Series No. 40A,B,C, WHO/Food Add./67.29, Toxicological Evaluation of Some Antimicrobials, Antioxidants, Emulsifiers, Stabilizers, Flour-Treatment Agents, Acids and Bases.)

3.3.1 TRANSPORT (Fugacity)

Type	:	
Media	:	

Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Year	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissocation products:** **Acid:** For propionic acid, the Henry's law constant is 4.15 x 10^{-7} atm.m^3/mol at 25°C
Reliability	:	
Reference	:	

3.5 BIODEGRADATION

Type	:	Aerobic
Guideline/method	:	OECD 302 B
Inoculum	:	Other: activated sludge
Concentration	:	300 mg/L related to DOC (dissolved organic carbon)
Contact time	:	
Degradation	:	100 % after 7 day(s)
Result	:	
Kinetic of test subst.	:	3 hours = 18 % (specify time and % degradation)
Control substance	:	
Kinetic	:	%
Deg. product	:	
Year	:	
GLP	:	
Test substance	:	
Deg. products CAS#	:	
Method	:	OECD Guideline 302B, Inherent biodegradability: Modified Zahn-Wellens Test
Method Detail	:	
Result	:	biodegradable
Remark	:	**Supporting data for dissociation products:** **Acid:** Propionic acid is biodegradable in activated sludge, with 40.4% removal of an initial concentration of 500 mg/L after 24 hours and 95% removal of an intial concentration of 400 mg/L after 10 days (See Appendix I: 3.5)
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	BASF AG, Labor Oekologie, unveroeffentlichte Untersuchung,(Laboratory of Ecology, unpublished research) (Ber. V.24.01.89. As cited in IUCLID (2000)

3.7 BIOCONCENTRATION

Type	:	
Guideline/method	:	
Species	:	
Exposure period	:	at °C
Concentration	:	
BCF	:	

Elimination	:
Year	:
GLP	:
Test substance	:
Method	:
Method detail	:
Result	:
Remark	:
Reliability	:
Reference	:

4.1 ACUTE TOXICITY TO FISH

Type	:	Static
Guideline/method	:	DIN38412 Teil 15, Bestimmung der Wirkkung von Wasserinhaltsstoffen auf Fische
Species	:	*Leuciscus idus*, freshwater fish
Exposure period	:	96 hours
NOEC	:	5000 mg/L
LC0	:	5000 mg/L
LC50	:	> 10000 mg/L
LC100	:	> 10000 mg/L
Other	:	
Other	:	
Other	:	
Limit test	:	
Analytical monitoring	:	No
Year	:	1982
GLP	:	No
Test substance	:	Calcium dipropionate
Method	:	DIN38412 Teil 15, Bestimmung der Wirkkung von Wasserinhaltsstoffen auf Fische
Method detail	:	
Result	:	Lethality to 2 of 10 fish after 96 hours at 10000 mg/L, no lethality at 5000 mg/L. No toxic symptoms detectable.
Remark	:	For sodium propionate, the 24-h LC50 for *Lepomis macrochirus* was 5000 mg/L. **Supporting data for dissociation products:** **Acid:** For propionic acid, the 48-h LC50 for *Cyprinus carpio* was 72 mg/L and the 24-h LC50 for *Lepomis macrochirus* was 188 mg/L. (See Appendix I: 4.1) Reported 96-h LC50 values for propionic acid include 85.3 ppm (95% CI 73.0 – 99.7ppm) for *Lepomis macrochirus* and 67.1 ppm (95% CI: 61.6 – 73.2 ppm) for *Oncorhynchus mykiss*. (US EPA Office of Pesticide Programs Environmental Effects Database, cited in ECOTOX)
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	BASF AG, Dept. Toxicology, unpublished study 10F0958/885187, 08.01.1990. As cited in IUCLID (2000)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	Static
Guideline/method	:	Directive 84/449/EEC, C.2, “Acute toxicity for *Daphnia*“
Species	:	*Daphnia magna* (water flea)
Exposure period	:	48 hours
NOEC	:	
EC0	:	250 mg/L
EC50	:	> 500 mg/L
EC100	:	> 500 mg/L
Other	:	24 h EC50 = 250 mg/L
Other	:	
Other	:	
Limit test	:	
Analytical monitoring	:	No
Year	:	1989
GLP	:	No
Test substance	:	Calcium dipropionate

Method	:	Directive 84/449/EEC, C.2, “Acute toxicity for *Daphnia*“
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissociation products:** **Acid:** For propionic acid, the 48-h EC50 for *Daphnia magna* was reported to be 50 mg/L. (See Appendix I: 4.2). Reported 48-h EC50 value for *Daphnia magna* for propionic acid was 22.7 ppm (95% CI: 21.0 – 24.6 ppm) [US EPA Office of Pesticide Programs Environmental Effects Database, cited in ECOTOX].
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	BASF AG, Labor Oekologie, unveroeffentlichte Untersuchung,(Laboratory of Ecology, unpublished research) (1540/88). As cited in IUCLID (2000)

4.3 TOXICITY TO AQUATIC PLANTS (e.g., Algae)

Type	:	Growth inhibition
Guideline/method	:	OECD guideline 201, Algae, Growth Inhibition Test
Species	:	*Scenedesmus subspicatus* (freshwater green algae)
Endpoint	:	
Exposure period	:	72 hours
NOEC	:	
LOEC	:	
EC0	:	
EC10	:	
EC50	:	> 500 mg/L
EC20	:	> 500 mg/L
Other	:	
Other	:	
Limit test	:	
Analytical monitoring	:	No
Year	:	1988
GLP	:	No
Test substance	:	Calcium dipropionate
Method	:	OECD guideline 201, Algae, Growth Inhibition Test
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissociation products:** **Acid:** For propionic acid, the 72-h EC50 for *Scenedesmus subspicatus* was reported to be 43 - 45.8 mg/L (See Appendix I: 4.3)
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	BASF AG, Labor Oekologie, unveroeffentlichte Untersuchung,(Laboratory of Ecology, unpublished research) (1540/88). As cited in IUCLID (2000)

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

In vitro/in vivo	:	
Type	:	
Guideline/method	:	
Species	:	
Number of animals	:	
Males	:	
Females	:	
Doses	:	
Males	:	
Females	:	
Vehicle	:	
Route of administration	:	
Exposure time	:	
Product type guidance	:	
Decision on results on acute tox. tests	:	
Adverse effects on prolonged exposure	:	
Half-lives	:	1st: 2nd: 3rd:
Toxic behavior	:	
Deg. product	:	
Deg products CAS#		
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	
Remark	:	**Supporting data for dissociation products:** **Acid:** Propionic acid is a normal intermediary metabolite in animals and humans. Propionic acid occurs naturally in various foods including butter and cheese. (FASEB, 1979).
Reliability	:	
Reference	:	

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Guideline/method	:	
Species	:	Rat
Strain	:	
Sex	:	Male and female
Number of animals	:	
Vehicle	:	
Doses	:	
LD50	:	3920 – 4380 mg/kg bw.
Year	:	
GLP	:	
Test substance	:	Calcium dipropionate
Method	:	
Method detail	:	
Result	:	LD50 was 3920 – 4380 mg/kg bw. For male rats, LD50 was 4280 or 4380 mg/kg. For female rats, LD50 was 3920 or 4040 mg/kg

Remark	:	For sodium propionate, the LD50 for the rat was 5100 mg/kg. **Supporting data for dissociation products:** **Acid:** For propionic acid, the following LC50 values for rats have been reported: 3470 mg/kg; 4290 mg/kg; 2600 mg/kg. For sodium propionate, the LD50 for the rat was 5100 mg/kg. (See Appendix I: 5.1.1)
Reliability	:	[4] Not assignable. Text is in Japanese, only tables appear in English
Reference	:	Kobayashi, H., H. Ichikawa, N. Kamiya, S. Yoshida, and K. Hiraga (1976). The results on acute toxicities of food additives. Ann. Rep. Tokyo Metr. Res. Lab. P.H., 27-2, 159-160. Also cited and interpreted in IUCLID (2000)
Additional references	:	Other oral LD50 values for rats: 5160 mg/kg bw; 2600 mg/kg bw; 6400 mg/kg bw (As cited in IUCLID, 2000)

Type	:	LD50
Guideline/method	:	
Species	:	Mouse
Strain	:	
Sex	:	Male and female
Number of animals	:	
Vehicle	:	
Doses	:	
LD50	:	2350 - 2900 mg/kg bw.
Year	:	
GLP	:	
Test substance	:	Calcium dipropionate
Method	:	
Method detail	:	
Result	:	LD50 was 2350 - 2900 mg/kg bw. For male mice, LD50 was 2350 or 2600 mg/kg. For female mice, LD50 was 2400 or 2900 mg/kg
Remark	:	For a similar compound, sodium propionate, the LD50 for the mouse was 5100 mg/kg bw, as cited in FASEB Report: Evaluation of the health aspects of propionic acid..., prepared for FDA, 1979.
Reliability	:	[4] Not assignable. Text is in Japanese, only tables appear in English
Reference	:	Kobayashi, H., H. Ichikawa, N. Kamiya, S. Yoshida, and K. Hiraga (1976). The results on acute toxicities of food additives. Ann. Rep. Tokyo Metr. Res. Lab. P.H., 27-2, 159-160. Also cited and interpreted in IUCLID (2000)
Additional references		LD50 of 3340 mg/kg for DD-strain mice is cited in FASEB (1979)

5.1.2 ACUTE INHALATION TOXICITY

Type	:	Limit test
Guideline/method	:	
Species	:	Rat
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
Exposure time	:	4 hours
LC50	:	> 5.4 mg/L
Year	:	
GLP	:	No
Test substance	:	
Method	:	
Method detail	:	
Result	:	The LC50 was reported to be > 5.4 mg/L
Remark	:	Also tested sodium propionate, dust aerosol, with same result.

Supporting data for dissocation products:
Acid: Under similar conditions as reported above for calcium propionate and sodium propionate, the LC50 for propionic acid was >4.9 mg/L. (See Appendix I: 5.1.2)

Reliability : [4] Not assignable. Only secondary literature
Reference : BASF AG, Dept. Toxicology, unpublished study 78/29, 19.12.1980. As cited in IUCLID (2000)

5.1.3 ACUTE DERMAL TOXICITY

Type	:	LD50
Guideline/method	:	
Species	:	Rabbit
Strain	:	
Sex	:	
Number of animals	:	
Vehicle	:	
Doses	:	
LD50	:	500 mg/kg bw
Year	:	
GLP	:	
Test substance	:	
Method	:	
Method detail	:	
Result	:	The LD50 was reported as 500 mg/kg bw
Remark	:	No further information. Same result cited for propionic acid
Reliability	:	[4] Not assignable. Only secondary literature.
Reference	:	Patty Ind. Hyg. Toxicol. (1982); Smyth, H.F. et al., Am. Ind. Hyg. Assoc. J. 23:95-107 (1962); Union Carbide Datasheet. As cited in IUCLID (2000)

5.2.1 SKIN IRRITATION

Type	:	Skin irritation
Guideline/method	:	
Species	:	Rabbit
Strain	:	
Sex	:	
Concentration	:	
Exposure	:	
Exposure time	:	
Number of animals	:	
Vehicle	:	
Classification	:	
Year	:	1973
GLP	:	No
Test substance	:	Calcium propionate feed grade, sodium propionate
Method	:	Draize test
Method detail	:	
Result	:	Not irritating
Remark	:	Sodium propionate was found to be not irritating in the Draize skin irritation test with rabbits. (See Appendix 1: 5.2.2) **Supporting data for dissociation products:** **Acid:** Propionic acid caused mild irritation to rabbits following 4 h closed contact of the skin with a 2.5% aqueous solution, mild to moderate irritation with 25% solution, and moderate to severe irritation and corrosion at

		concentrations of 40% and above. Propionic acid ws a severe irritant to guinea pig skin. (See Appendix I: 5.2.1)
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	BASF AG, Dept. Toxicology, unpublished study 78/28, 78/29 and 78/30. 25.04.1979. As cited in IUCLID (2000)

5.2.2 EYE IRRITATION

Type	:	Eye irritation
Guideline/method	:	
Species	:	Rabbit
Strain	:	
Sex	:	
Concentration	:	
Dose	:	
Exposure time	:	
Number of animals	:	
Vehicle	:	
Classification	:	
Method	:	
Year	:	1973
GLP	:	
Test substance	:	Calcium propionate feed grade, sodium propionate
Method	:	Draize test
Method detail	:	
Result	:	Not irritating
Remark	:	Sodium propionate was found to be not irritating in the Draize eye irritation test with rabbits. Propionic acid was irritating to rabbits (See Appendix 1: 5.2.2)
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	BASF AG, Dept. Toxicology, unpublished study 78/28, 78/29 and 78/30. 25.04.1979. As cited in IUCLID (2000)

5.4 REPEATED DOSE TOXICITY

Type	:	Repeated dose
Guideline/method	:	
Species	:	Rat
Strain	:	Wistar Han/BGA
Sex	:	Male and female
Number of animals	:	40
Route of admin.	:	Oral feed
Exposure period	:	90 days
Frequency of treatment	:	Daily
Post exposure period	:	One group for control and two highest doses over 90 and 180 days
Doses	:	0.2, 0.5, 1 and 4% (= 166, 415, 830, 3320 mg/kg bw)
Control group	:	Yes
NOAEL	:	0.2% (166 mg/kg) for males, 1% (830 mg/kg) for females
LOAEL	:	
Other	:	
Year	:	
GLP	:	
Test substance	:	Not clarified but presumed to be calcium propionate
Method	:	

Method detail	:	
Result	:	No abnormalities in clinical and hematological examination and organ weights. In forestomach of males, hyperkeratosis and hyperplasia of mucosa, at 4% 1/10 atypical basal cell proliferation and 5/10 dysplasia. In forestomach of females, hyperkeratosis and hyperplasia at 4% (hyperkeratosis also in controls) in different regions of forestomach. Effects largely reversible during 90-day post exposure observation period. After 180 days appearance of first age-related changes in the forestomach.
Remark	:	Forty female Wistar rats fed sodium propionate at 20000 ppm (1320 mg/kg) for one year did not exhibit any hematological, clinicochemical, or urinalytic changes. There were no changes in organ weights and the body weight at the end of the study was 290 g versus 299 g in controls. [Imai, S. , S. Sekigawa, J. Morimoto, Y. Ohno, H. Yamamoto, T. Okuyama, K. Nakamor and Y. Tsubura (1981). Additive toxicity of sodium propionate and/or sorbic acid in SLC-Wistar rats for one year. J. Nara. Med. Ass. 32:715-722. Also interpreted and cited in IUCLID (2000)]. **Supporting data for dissociation products:** **Acid:** Beagles fed propionic acid for 90 days exhibited lack of appetite at the highest dose (2000 mg/kg bw) but no other clinical, hematological or clinico-chemical effects. (See Appendix I: 5.4). Propionic acid in the diet (4% or 3320 mg/kg) of rats caused enhanced incorporation of methyl-H3-thymidine in the mucosa of the forestomach after 21 and 28 days of treatment, and macroscopic and histological lesions (general and nodular mucosal thickening) were observed in the forestomach after 27 days. This may reflect the response of the forestomach epithelium to changed pH (Rodrigues, C., Lok, E., Nera, E., Iverson, F., Page, D., Karpinski, K. and Clayson, D.B., 1986. Short-term effects of various phenols and acids on the Fischer 344 male rat forestomach epithelium, Toxicology 38:103-117).
Reliability	:	[4] Not assignable. Only secondary literature
Reference	:	Altman H-J and Grunow, W., „Ergeb. Neuer. Fuetterungsvers.m.Propions.u.i.Salzen“ unpubl. Report Fed. Health Agency (BGA Berlin ,’88). As cited in IUCLID (2000)

Addtional References for Repeated Dose Toxicity: Rats (Wistar HAN/BGA) were exposed to 40,000 ppm (3320 mg/kg) calcium propionate in the diet for 4 weeks (females) or 8 weeks (males). Feed consumption, body weight gain and absolute organ weights were reduced. For the 4-week exposure, a slight thickening of the limiting ridge in the forestomach was observed. Hyperkeratosis and hyperplasia of mucosa were clearly far less pronounced for calcium propionate as compared to the acid [Altman H.-J. and Grunow, W., Arbietspapier zur Tox. V. Propions. U.i. Ca-, K-, und Na-Saltze, unpubl. Report Fed Health Agency, BGA Berlin ,88 and Altman, H.-J. and Grunow, W., Ergeb. Neuer. Fuetterungsvers.m. Propions.u.i.Salzen“ unpubl. Report Fed. Health Agency (BGA Berlin ,’88). As cited in IUCLID (2000)]. In a paired feeding study, rats given calcium propionate or sodium propionate (approximately 750 mg/kg/day, expressed as propionic acid, for 4 weeks followed by 1200 mg/kg/day for 3 weeks) did not show any difference in weight gain from control animals. No hematological or clinicochemical parameters were measured in this study [Harshbarger, K.E., 1942. Report of a study on the toxicity of several food preserving agents. J. Dairy Sci. 25:169-174. Also cited and interpreted in FASEB (1979).] In a 90-day feeding study with male beagles, 435000 ppm calcium propionate caused diarrhea and vomiting in all animals but 14500 ppm caused these effects in only one dog. No hematological or clinicochemical parameters were measured in this study. [Altman H-J and Grunow, W., „Ergeb. Neuer. Fuetterungsvers.m.Propions.u.i.Salzen“ unpubl. Report Fed. Health Agency (BGA Berlin ,’88); BASF AG, Dept. Toxicology, unpublished study 31D0449/87039, 06.04.1989. As cited in IUCLID (2000)].

5.5 GENETIC TOXICITY ‘IN VITRO‘

Type	:	Mutagenicity
Guideline/method	:	
System of testing	:	Repair test (rec assay) and reversion assay

Species	:	*Bacillus subtilis* (rec assay); *Escherichia coli* and *Salmonella typhimurium* (reversion assay)
Strain	:	*B. subtilis*: H17 Rec^+ and M45Rec^-; *E.coli*: WP2 *hcr trp*; *S. typhimurium*: TA98, TA100, TA1535, TA 1537, TA1538
Test concentrations	:	No data specified
Cytotoxic concentr.	:	
Metabolic activation	:	Conducted both with and without activation. Activation system consisted of S-9 mix prepared from liver homogenate of Arochlor 1254-pretreated male rats (i.p at 500 mg/kg)
Year	:	
GLP	:	No data
Test substance	:	Calcium propionate; purity > 98%
Method	:	Rec assay using paper disk method, according to Shirasu, Y. et al., Mutat. Res. 56: 121-129. Reverse mutation assay according to Ames, B.N., Mutat. Res. 31: 347-364
Method detail	:	DMSO solvent.
Result	:	Negative
Remark	:	Sodium propionate was negative in the Ames assay. (Ishidate, et al., 1984, as cited in Basler et al., 1987) **Supporting information for dissociation products:** **Acid:** Propionic acid was evaluated for genotoxic properties using the *E.coli* DNA repair assay, the SOS chromotest, the Salmonella/microsome mutagenicity test, the sister chromatid exchange test *in vitro* and the micronucleus test *in vivo*. All tests except the DNA repair assay yielded negative results. The authors concluded that this evidence supported other evidence, including studies with calcium and sodium propionate, that propionic acid was not mutagenic (Basler, A., von der Hude, W. and Scheutwinkel, M., 1987. Screening of the food additive propionic acid for genotoxic properties, Fd. Chem. Toxic. 25:287-290). The authors conclude that since calcium and sodium propionate dissociate in aqueous solution and react with a proton to form the acid, results with all three test substances can be compared.
Reliability	:	[2] Reliable with restrictions. Conducted according to scientifically acceptable methods.
Reference	:	Ohta, T., M. Moriya, Y. Kaneda, K. Watanabe, T. Miyazawa, F. Sugiyama and Y. Shirasu (1980). Mutagenicity screening of feed additives in the microbial system. Mutat. Res. 77: 21-30. Also cited in IUCLID (2000)

Addtional References for Genetic Toxicity in Vitro: In the Ames test with *S. typhimurium* (TA98, TA100, TA 1535, TA1537 and TA 1538), with a test concentration of 0.95 mg/mL calcium propionate, with and without metabolic activation (S9 from rat, mouse and hamster), the result was negative. [Altman H.-J. and Grunow, W., Arbietspapier zur Tox. V. Propions. U.i. Ca-, K-, und Na-Saltze, unpubl. Report Fed Health Agency, BGA Berlin ,88; Litton Bionetics report prepared for FDA, PB 266897 (1976). As cited in IUCLID (2000).] Negative results were obtained in the Ames test with *Salmonella typhimurium* strains TA-1535, TA-1537, TA-1538 and *Saccaromyces cerevisiae* strain D-4, with activation (preparations were from lung, liver, and testis of mouse, rat, and monkey. [Litton Bionetics, Inc., 1974. Mutagenic evaluation of compound FDA 71-36, calcium propionate, NTIS PB245448]. Calcium dipropionate was negative in the cytogenetic assay using CHL cells, without activation, and in the sister chromatid exchange assay,using V79 cells, with and without activation [Altman, ibid.]. Calcium and sodium propionate were negative in the Ames test; calcium propionate caused a slight increase in the number of Chinese hamster lung cells but sodium propionate caused no chromosomal abberrations even at a higher concentration (Ishidate et al., 1984, as cited in Basler et al., 1987).

5.6 GENETIC TOXICITY 'IN VIVO'

Type	:	Cytogenetic assay and dominant lethal assay
Guideline/method	:	

Species	:	Rat
Strain	:	Sprague-Dawley CD
Sex	:	male
Route of admin.	:	Oral (gastric intubation)
Exposure period	:	Acute study: single dose, then observed for 10 days. Subacute study: Dosed every 24 hours for 5 days.
Doses	:	5000 mg/kg (single dose) or 50, 500 and 5000 mg/kg (subacute)
Year	:	1973
GLP	:	No
Test substance	:	Calcium dipropionate
Method	:	
Method detail	:	Negative control (saline) and postive control used. Single dose study conducted with two rats at 5000 mg/kg bw, then repeated with ten rats at same dose.
Result	:	No increase of chromosome aberrations in bone marrow cells. In addition, no dominant lethal mutations detected.
Remark	:	No increase in chromosome abberations in the bone marrow cells of the rat were observed after dosing with sodium propionate (See Appendix I: 5.6) **Supporting data for dissociation products:** **Acid:** Propionic acid was not genotoxic in the micronucleus test *in vivo*. (Basler, A., von der Hude, W. And Scheutwinkel, M., 1987. Screening of the food additive propionic acid for genotoxic properties, Fd. Chem. Toxic. 25:287-290).
Reliability	:	[1] Reliable without restrictions. Methods described and complete data presented. Comparable to guideline study.
Reference	:	Litton Bionetics, Inc. (1974). Mutagenic evaluation of compound FDA 71-36. Report prepared for FDA, NTIS PB 245448 (1974).

Type	:	Host mediated assay
Guideline/method		
Species	:	Mouse
Strain	:	ICR
Sex	:	Male
Route of admin.	:	Oral (gastric intubation)
Exposure period	:	Acute study: single dose, then observed for 10 days. Subacute study: Dosed every 24 hours for 5 days.
Doses	:	5000 mg/kg (single dose) or 50, 500 and 5000 mg/kg (subacute)
Year	:	1973
GLP	:	No
Test substance	:	Calcium dipropionate
Method	:	
Method detail	:	Negative control (saline) and positive controls used. Ten animals at each dose level for both acute and subacute study.
Result	:	Increase in reversion frequency of *S. typhimurium* G-46 but not dose-related. No mutations in strain TA-1530 and *Saccharomyces cerevisiae* D3. A single dose was marginally recombinogenic in the acute trials using *S. cerevisiae* D3 but none of the other acute or subacute doses showed this effect.
Remark	:	
Reliability	:	[1] Reliable without restrictions. Methods described and complete data presented. Comparable to guideline study.
Reference	:	Litton Bionetics, Inc. (1974). Mutagenic evaluation of compound FDA 71-36. Report prepared for FDA, NTIS PB 245448 (1974).

5.8.2 DEVELOPMENTAL TOXICITY

Type	:	Developmental toxicity
Guideline/method	:	
Species	:	Mouse
Strain	:	Albino CD-1
Sex	:	Female
Route of admin.	:	Gavage
Exposure period	:	Day 6 -15 of gestation
Frequency of treatment	:	Daily
Duration of test	:	Until day 17 of gestation
Doses	:	3, 14, 65, 300 mg/kg/d
Control group	:	Yes, concurrent sham-treated
NOAEL maternal tox.	:	NOAEL not reported, but no effects seen at highest dose (300 mg/kg/d)
NOAEL teratogen.	:	NOAEL not reported, but no effects seen at highest dose (300 mg/kg/d)
Other	:	
Other	:	
Other	:	
Year	:	1972
GLP	:	No
Test substance	:	Calcium propionate
Method	:	
Method detail	:	Groups of 25-30 mice were used. Negative controls were intubated with water, positive controls were administered 150 mg/kg/d of aspirin. Animals were observed daily for appearance, behavior, food and water consumption. Body weight was recorded on days 0,6,11,15 and 17 of gestation. On day 17 of gestation, all dams were subjected to Casarean section and the number of corpora lutea, implantation sites, resorption sites, and live and dead fetuses recorded. Body weights of live pups recorded and urogenital tract of each dam was examined for anatomical normality. All fetuses were examined grossly for abnormalities. One third of the fetuses of each litter underwent detailed visceral examination under 10x magnification; two thirds cleared, stained and examined for skeletal defects.
Result	:	No clearly substance-related effects on pregnancy parameters or on maternal or fetal survival were observed. The number of abnormalities in the soft or skeletal tissues in treated groups was not different from negative controls.
Remark	:	
Reliability	:	[2] Reliable with restrictions. Generally comparable to current guideline methodology, but level of recorded detail (both methods and results) is not consistent with current guidelines. No statistical analyses of results was performed.
Reference	:	Food and Drug Research Labs, Inc.,(1972) Teratologic Evaluation of FDA 71-36 (Calcium propionate) in mice, rats, hamsters and rabbits, Final report for FDA, NTIS PB-221778.

Type	:	Developmental toxicity
Guideline/method	:	
Species	:	Rabbit
Strain	:	Dutch-belted
Sex	:	Female
Route of admin.	:	Gavage
Exposure period	:	Day 6 -18 of gestation

Frequency of treatment	:	Daily
Duration of test	:	Until day 29 of gestation
Doses	:	4, 19, 86, 400 mg/kg/d
Control group	:	Yes, concurrent sham-treated
NOAEL maternal tox.	:	NOAEL not reported, but no effects seen at highest dose (400 mg/kg/d)
NOAEL teratogen.	:	NOAEL not reported, but no effects seen at highest dose (400 mg/kg/d)
Other	:	
Other	:	
Other	:	
Year	:	
GLP	:	No
Test substance	:	Calcium propionate
Method	:	
Method detail	:	Groups of 15-25 rabbits were used. Negative controls were intubated with water, positive controls were administered 2.5 mg/kg of 6-aminonicotinamide on day 9. Animals were observed daily for appearance, behavior, food and water consumption. Body weight was recorded on days 0,6,12,18 and 29 of gestation. On day 29 of gestation, all dams were subjected to Casarean section and the number of corpora lutea, mplantation sites, resorption sites, and live and dead fetuses recorded. Body weights of live pups recorded and urogenital tract of each dam was examined for anatomical normality. All fetuses were examined grossly for abnormalities. Live fetuses were placed in an incubator for 24 hours for the evaluation of neonatal survival. All surviving pups were sacrificed and examined for visceral abnormalities (by dissection), then cleared, stained and examined for skeletal defects.
Result	:	No clearly substance-related effects on pregnancy parameters or on maternal or fetal survival were observed. The number of abnormalities in the treated groups was not different from negative controls.
Remark	:	
Reliability	:	[2] Reliable with restrictions. Generally comparable to current guideline methodology, but level of recorded detail (both methods and results) is not consistent with current guidelines. No statistical analyses of results was performed.
Reference	:	Food and Drug Research Labs, Inc.,(1972) Teratologic Evaluation of FDA 71-36 (Calcium propionate) in mice, rats, hamsters and rabbits, Final report for FDA, NTIS PB-221778.

Type	:	Developmental toxicity
Guideline/method	:	
Species	:	Hamster
Strain	:	Golden hamsters from an outbred strain (no further data)
Sex	:	Female
Route of admin.	:	Gavage
Exposure period	:	Day 6 -10 of gestation
Frequency of treatment	:	Daily
Duration of test	:	Until day 14 of gestation
Doses	:	4, 19, 86, 400 mg/kg/d
Control group	:	Yes, concurrent sham-treated
NOAEL maternal tox.	:	NOAEL not reported, but no effects seen at highest dose (400 mg/kg/d)
NOAEL teratogen.	:	NOAEL not reported, but no effects seen at highest dose (400 mg/kg/d)
Other	:	
Other	:	
Other	:	

Year	:	
GLP	:	No
Test substance	:	Calcium propionate
Method	:	
Method detail	:	Groups of 22 golden hamsters were used. Negative controls were intubated with water, positive controls were administered 250 mg/kg/d of aspirin. Animals were observed daily for appearance, behavior, food and water consumption. Body weight was recorded on days 0,8,10, and 14 of gestation. On day 14 of gestation, all dams were subjected to Casarean section and the number of corpora lutea, implantation sites, resorption sites, and live and dead fetuses recorded. Body weights of live pups recorded and urogenital tract of each dam was examined for anatomical normality. All fetuses were examined grossly for abnormalities. One third of the fetuses of each litter underwent detailed visceral examination under 10x magnification; two thirds cleared, stained and examined for skeletal defects.
Result	:	No clearly substance-related effects on pregnancy parameters or on maternal or fetal survival were observed. The number of abnormalities in the treated groups was not different from negative controls.
Remark	:	
Reliability	:	[2] Reliable with restrictions. Generally comparable to current guideline methodology, but level of recorded detail (both methods and results) is not consistent with current guidelines. No statistical analyses of results was performed.
Reference	:	Food and Drug Research Labs, Inc.,(1972) Teratologic Evaluation of FDA 71-36 (Calcium propionate) in mice, rats, hamsters and rabbits, Final report for FDA, NTIS PB-221778.

Type	:	Developmental toxicity
Guideline/method	:	
Species	:	Rat
Strain	:	Albino, Wistar
Sex	:	Female
Route of admin.	:	Oral intubation
Exposure period	:	Day 6 -15 of gestation
Frequency of treatment	:	Daily
Duration of test	:	Until day 20 of gestation
Doses	:	3, 14, 65, 300 mg/kg/d
Control group	:	Yes, concurrent sham-treated
NOAEL maternal tox.	:	NOAEL not reported, but no effects seen at highest dose (300 mg/kg/d)
NOAEL teratogen.	:	NOAEL not reported, but no effects seen at highest dose (300 mg/kg/d)
Other	:	
Other	:	
Other	:	
Year	:	
GLP	:	No
Test substance	:	Calcium propionate
Method	:	
Method detail	:	Groups of 24 rats were used. Negative controls were intubated with water, positive controls were administered 250 mg/kg/d of aspirin. Animals were observed daily for appearance, behavior, food and water consumption. Body weight was recorded on days 0,6,11,15 and 20 of gestation. On day 20 of gestation, all dams were subjected to Casarean section and the number of corpora lutea, implantation sites, resorption sites, and live and dead fetuses recorded. Body weights of live pups recorded and urogenital

		tract of each dam was examined for anatomical normality. All fetuses were examined grossly for abnormalities. One third of the fetuses of each litter underwent detailed visceral examination under 10x magnification; two thirds cleared, stained and examined for skeletal defects.
Result	:	No clearly substance-related effect on pregnancy parameters or on maternal or fetal survival were observed. The number of abnormalities in the treated groups was not different from negative controls.
Remark	:	
Reliability	:	[2] Reliable with restrictions. Generally comparable to current guideline methodology, but level of recorded detail (both methods and results) is not consistent with current guidelines. No statistical analyses of results was performed.
Reference	:	Food and Drug Research Labs, Inc.,(1972) Teratologic Evaluation of FDA 71-36 (Calcium propionate) in mice, rats, hamsters and rabbits, Final report for FDA, NTIS PB-221778.

Type	:	Developmental toxicity
Guideline/method	:	
Species	:	Chicken
Strain	:	
Sex	:	
Route of admin.	:	Injection into air cell or yolk sac of eggs
Exposure period	:	Preincubation or at 96 hours
Frequency of treatment	:	
Duration of test	:	
Doses	:	5, 10, 100 mg/kg of egg
Control group	:	Yes, concurrent vehicle
NOAEL maternal tox.	:	
NOAEL teratogen.	:	100 mg/kg
Other	:	High mortality rates at doses of 5 and 10 mg/kg
Other	:	
Other	:	
Year	:	
GLP	:	
Test substance	:	Calcium propionate
Method	:	
Method detail	:	
Result	:	Not teratogenic to developing chicken embryo at levels up to 100 mg/kg of egg preincubation or at 96 h via the yolk and air cell. A dose of 10 mg/kg of egg produced high mortality rates compared to solvent controls, and a dose of 5 mg/kg administered preincubation via the yolk caused a high mortality rate.
Remark	:	
Reliability	:	[4] Not assignable. Only secondary reference.
Reference	:	Mississippi State University, 1973. Investigation of the toxic effects of GRAS substances to the developing chicken embryo: calcium propionate. As cited in FASEB (1979)

5.8.3 TOXICITY TO REPRODUCTION

Type	:	
Guideline/method	:	
In vitro/in vivo	:	
Species	:	
Strain	:	

Sex	:
Route of admin.	:
Exposure period	:
Frequency of treatm.	:
Duration of test	:
Doses	:
Control group	:
Year	:
GLP	:
Test substance	:
Method	:
Method detail	:
Result	:
Remark	:
Reliability	:
Reference	:

6.0 OTHER INFORMATION

6.1 CARCINOGENICITY

Supporting information for dissociation products:
Acid: Pre-neoplastic/pre-cancerous changes in rats fed 4% (2640 mg/kg) propionic acid were reported by Griem (1985). Hyperplasia, hyperplastic ulcers, papillomas and proliferation of the basal cells in the mucuosa of the forestomach were observed. Over the lifetime exposure, the high dose (4% propionic acid) resulted in 19/20 rats with dysplasia of glandular stomach mucosa while this effect was seen in 10/20 rats at the low dose (0.4%) and 5/20 control rats. However, Basler et al. (1987) concluded that propionic acid is not mutagenic and that genotoxic events are unlikely to be involved in the generation of these forestomach lesions. (See Appendix I: 5.7; also Basler, A., von der Hude, W. And Scheutwinkel, M., 1987. Screening of the food additive propionic acid for genotoxic properties, Fd. Chem. Toxic. 25:287-290).

6.2 EXEMPTION FROM TOLERANCE:

Supporting Decision by the Environmental Protection Agency, Office of Pesticide Programs to grant an Exemption from Tolerence:
In the Federal Register , August 4, 2004 [(Volume 69, Number 149), Rules and Regulations, pages 47022-47025] a Final Rule was announced. This regulation establishes an exemption from the requirement for tolerance for residues of propanoic (propionic) acid and its calcium and sodium salts on alll raw agricultural commodities, ...and reorganizes current tolerance exemptions. The action was initiated by a company interested in only three crops sugar beets, potatoes and sweet potatoes under the Food , Drug, and Cosmetic Act (FFDCA), as ammended by the Food Quality Protection Act of 1996. The EPA reviewed the existing data relative to human health and published a proposed rule persuant to section 408 of FFDCA. The expanded rule presented in this Federal Register notice establishes a broad exemption for tolerance for any residues of propanoic (or propionic) acid and the respective calcium and sodium salts on all crops when the chemicl is used as a fungicide or as an inert inredient in pesticides.