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Minerals in Sports

Minerals at Torino*

Events at the 2006 Winter Olympics at Torino, Italy, include figure skating, ice hockey, speed skating, bobsled, luge, skeleton, curling, snowboarding, Alpine (downhill) skiing, freestyle skiing, slalom, ski jumping, Nordic combined (cross country skiing and ski jumping), cross country skiing, and biathlon (cross country skiing and shooting). All Winter Olympics events depend on two crystalline forms of water: ice and snow. In nature, compacted snow may recrystallize and become ice, or ice may form on water. At the Olympics, water for each event is artificially crystallized to standard specifications. Snow- and ice-making and grooming equipment have specialized parts made of aluminum, copper, steel, and other metals; some of the equipment is controlled by computers, which contain metals and industrial minerals. The Olympic torch was originally wood, but it is now high-tech, with an aluminum body and inside fittings of steel, copper, and heat-resistant polymers. The medals really do contain gold, silver, and bronze (copper alloyed with tin); gold and silver are fairly soft metals, so they are alloyed with other metals for hardening and color modification (cadmium, copper, indium, silicon, tin, and zinc). Some of the Olympic contestants themselves have had injuries repaired with permanent titanium screws, plates, and rods—metallic badges of courage for past encounters with the slopes and the rinks.

SPORTS EQUIPMENT

Equipment used in Winter Olympics events was formerly composed almost entirely of wood and steel. Both materials are still used, but other materials, including aluminum, fiberglass, mineral-based fibers, and specialty steel alloys are now important components as well.

Sports equipment must meet Olympic standards for weight, surface characteristics (including temperature for sled runners), and safety, but the equipment is always evolving. Mineral materials continue to be the basis for most equipment. For example, metals give strength and durability to skate blades and sled runners, and industrial minerals are hidden in paints and pigments used on helmets and sled bodies and serve as strengthening fibers and fillers in plastics.

CURLING

Curling stone: Granite (42-pound stone; most come from Scotland and Wales); molded plastic handle attached with steel bolt; bolt hole lined with brass (copper and zinc, with or without aluminum, lead, manganese, silicon, and tin).

*Only a few minerals are listed here. More information on minerals and how they contribute to sports and everyday life can be found on the USGS minerals information Web site at URL http://minerals.usgs.gov/minerals.

HOCKEY AND SKATING
Ice skate: Chrome-plated, carbon-steel blade.
Hockey stick: Aluminum, carbon fiber shaft and blade.
Puck: Vulcanized rubber disk. (Sulfur is used in the manufacture of rubber.)
Goalie mask: Stainless steel cage, which is sometimes plated with a chromium alloy. (Stainless steel contains a variety of ferrous metals, including nickel and chromium.)

SKIING AND SNOWBOARDING
Ski: Aluminum, titanium, carbon-fiber, and boron-fiber base; tungsten heavy alloy balance weights.
Boot: Advanced ceramics (piezoelectric ceramic-fiber composites: aluminum oxide, clay, hydroxyapatite, lead zirconate titanate, lithium, silica, silicon carbide, tin oxide, titanium dioxide, yttria-stabilized zirconia, zirconium diboride) and steel.
Pole: Aluminum shaft; tungsten carbide tip.
Biathlon rifle: Nitride-steel or stainless steel barrel.

SLEDDING
Luge: Steel sled runners (called "steels"), cufins or kufens (steering blades), and bridges that connect the kufens. Steel also is used in spikes worn on the fingertips or backs of knuckles to aid in quick starts.
Skeleton: Steel sled body and fast-start shoe spikes; polished stainless steel runners.

OLYMPIC VILLAGE INFRASTRUCTURE

Torino's Olympic Village and outlying roadways and venues are solid, functional, long-lasting, and attractive showcases for local mineral-based building materials. The new buildings are designed to complement the city's existing architecture, some of which dates back to ancient Roman times.

STADIUM
Steel (iron), concrete (limestone, clay, gypsum [cement], and crushed stone and sand and gravel [aggregates]), glass (silica sand, feldspar), tile (clay, feldspar), aluminum, and dimension stone.

KITCHENS AND GIFT SHOPS
Stainless steel is everywhere—even the commemorative collapsible drinking cup is made of polished stainless steel.

ROADS AND TRANSPORTATION
Aggregates and concrete are the main components of the roads. One car company is supplying innovative electric cars for Torino that run on nickel-metal hydride batteries. Ski-lift cables are made of alloy steel, and the lift cars and seats contain aluminum and steel.

COMMUNICATIONS, POWER, AND LIGHTING
Aluminum, copper, gases (halides, neon, sodium), glass fiber, lighting glass, steel, and tungsten.

Sources
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*Wikinews, 2005, The 2006 Winter Olympic torch reaches Rome (*http://en.wikinews.org/wiki/The_2006_Winter_Olympics_torch_reaches_Rome*)*
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