

10 μm Spectra of Comets and the Composition of Silicate Grains

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A 10 μm emission feature is seen in filter photometry of many comets, but high signal/noise spectra exist for only a few. Spectra of Bradfield 1987 XXIX, Levy 1990 XX, both long period comets, and P/J Halley show a strong, double-peaked emission feature with maxima at 9.8 μm and 11.25 μm . They differ by 1.4 μm in their width and 8-9 μm rise. No single silicate mineral can account for the observed emission feature. Mg-rich olivine (forsterite) matches the 11.25 μm peak, while enstatite and amorphous olivine have maxima at 9.8 μm . To fit the 8-9 μm rise, amorphous enstatite, amorphous anorthite, or hydrated silicates are possible. Based on the spectra, data from the Halley flybys, and chondritic aggregate IDPs, a mix of Mg-rich olivine and pyroxenes seems the most likely composition of the silicates.

The new comets Wilson 1987 VII, OLR 1989 XIX, and Austin 1990 V each have a unique spectrum that differs from those above, implying differences in the composition of the silicates.

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