

INORGANIC OZONIDES

by

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Alkali metal ozonides, except lithium ozonide, may be prepared by the reaction of either the metal hydroxide or superoxide with dilute gaseous ozone. All of these compounds are red, paramagnetic solids that are soluble in liquid ammonia; their stability increases as the size of the cation increases.

Sodium ozonide appears to exist in two forms; one is soluble in liquid ammonia and unstable at room temperature, and the other is insoluble and stable.

Ammonium ozonide has been prepared by the low temperature ozonization of ammonia, and has been characterized by electron paramagnetic resonance and visible spectroscopy. Its visible spectrum has the characteristic five-peaked ozonide structure which shows a maximum in the vicinity of 450 m μ . The compound is thermally unstable and starts to decompose above -120° C. Its decomposition products are ammonium nitrate, oxygen, and water.

Tetramethylammonium ozonide has been prepared and characterized. Electron paramagnetic resonance measurements show that the compound is a free radical with one unpaired electron. Its visible spectrum is very similar to those of the alkali metal ozonides, which have wavelength maximums near 450 m μ . The solubility of tetramethylammonium ozonide at -63° C is 1.3 ± 0.1 g per 100 g of liquid ammonia. The heat of formation of the pure material was found to be 49.5 ± 4.2 kcal per mole.

The structure of potassium ozonide has been calculated from x-ray diffraction powder data.