

HEALTH HAZARDS IN THE PRODUCTION AND HANDLING OF VANADIUM PENTOXIDE

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THE METALLIC element vanadium (V, atomic weight 50.95, discovered by the Swedish scientist Sefström in 1830) has become increasingly useful because of its hardness and ability to combine with iron, forming an alloy, so-called ferro-vanadium, and is in great demand in the manufacture of hard steel alloys. In the production of such alloys the pentoxide, V_2O_5 , is generally used. It is also used as a catalyzer in chemical industries—for example, in the modified contact process of manufacturing sulfuric acid. Compounds of vanadium are also used as mordants in dyeing and the preparation of ink, as accelerators in the drying of paints and varnishes, in insecticides, photographic chemicals, and in glass manufacture. The fact that the consumption increased in Germany from 150,000 Kg. in 1934 to 400,000 Kg. in 1937, and to 5,000,000 Kg. during the last war, and in England from 170,000 Kg. in 1936 to 2,500,000 Kg. in 1943 is further evidence of its rapidly increasing importance. It is also a matter of considerable economic importance, as vanadium is as yet comparatively costly.

With the increased use of vanadium, the handling of its compounds has become a problem of industrial hygiene of great importance so far as the health of the workers concerned is affected.

Vanadium is related to arsenic, phosphorus and antimony, on one hand, and to niobium, tantalum and chromium, on the other. The element mostly has a valence of V, but also II, III, IV and VII. It combines readily with oxygen, nitrogen, carbon and with other metals. The pentavalent salts are called metavanadates (RVO_3), orthovanadates (R_2VO_4), and pyrovanadates ($R_4V_2O_7$); the quadrivalent salts are called vanadites. The technically most important vanadium compound, the pentoxide, V_2O_5 , is slowly soluble in water, more readily in acids and most readily in alkali (forming vanadates).

Vanadium occurs fairly extensively in nature, although mostly in very small concentrations. The crust of the earth is said to contain approximately 0.01 per cent of vanadium. It is commonest in iron ore rich in titanium, in apatite iron ore and in carnotite (hydrated potassium uranium vanadate). Vanadium occurs also in the ashes of some plants (sugar beet, vine, beech, oak) as well as in some lower marine animals (Ascidacea, where it is probably contained in certain enzymes essential for life), and, very likely for this reason, in certain mineral oils and in coal. With

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