

(sprays and powder used as insecticide in agriculture), this potentiality deserves increased attention in the future. This warning seems to be especially warranted, as Nieberle recently reported the endemic occurrence of adenocarcinoma of the nasal sinuses in sheep kept on a large estate in Saxony within the fume and dust zone of arsenic smelters of Freiberg. As arsenic was found in the tumor tissue, in the brain, and liver, and attacks of acute arsenic poisoning were frequently observed among members of the herd in which these carcinomas were found, Nieberle suggested that the inhalation of arsenic dust was responsible for the nasal malignancies.

Chromates

Chemical and Technological Aspects. Chromium and its numerous compounds have entered only recently the field of large scale production. They have found extensive use in industry. Chromium is a metallic element of white color, possessing valences ranging from two to six. It does not occur free in nature but mainly in the form of trivalent or hexavalent ores [ferrous chromite, $\text{Fe}(\text{CrO}_2)_2$, $\text{FeO} \cdot \text{Cr}_2\text{O}_3$ (United States, Rhodesia, and India), crocoite (PbCrO_4), chrome ochre (Cr_2O_3), and as potassium chromates, redingtonit, phospho-chromates, and ferrous thiochromite].

Metallic chromium and numerous industrially used chromium compounds are in general obtained from chemical processing of alkali chromates and dichromates (sodium and potassium compounds). The chief source of these chromates and dichromates is ferrous chromite ore. The mined ore is first crushed and ground to a powdery form. This chromate flour is heated in an oven with the exclusion of air, and then roasted together with sodium carbonate or potassium carbonate, respectively, in the presence of lime. The resulting compounds are chromate salts of sodium or potassium, respectively ($4 \text{ FeCr}_2\text{O}_4 + 8 \text{ Na}_2\text{CO}_3 + 7 \text{ O}_2 \rightarrow 2 \text{ Fe}_2\text{O}_3 + 8 \text{ Na}_2\text{CrO}_7 + 8 \text{ CO}_2$). The molten mass is then cooled and again heated after addition of water and soda. The lime and iron are then filtered off, and the remaining material is treated with sulfuric acid. Upon evaporation of the liquid parts the dichromate compound crystallizes out. This product is dried and crushed and is then ready for industrial use.

The industrial and commercial importance of chromium and its compounds is considerable and growing at a rapid rate. Chromium is used widely for electroplating of metal parts, in the production of various alloys, especially with steel (stainless steel). Chromic acid or usually chromium trioxide, potassium or sodium chromate and bichromate, and chrome alum are used in the manufacture of chromium pigments, as dye mordants, for tanning of hides, for the manufacture of aniline dyes, of colored crayons, inks, colored paper, artificial colored flowers, colored glass, blue print making, calico printing, frosting and enameling, explosives, bleaching of oils, tallow and fat, staining of wood, in photography for making gelatine insoluble, for manu-