

a relocation of its wide distribution in nature. Sharpless and McCollum (1933) fed animals diets low in fluoride and have observed no deleterious effects."

"Pharmacological Actions. These can be classified as toxic. Fluoride is a general protoplasmic poison. The ion is bactericidal, inhibits enzymatic activity, diminishes tissue respiration and anaerobic glycolysis in excised organs, and decreases oxygen consumption and lactic acid production in muscle. It has also been claimed that fluoride decreases the oxygen consumption and carbon dioxide production in intact animals. Fluorides are also anticoagulants. This probably results from the precipitation of calcium, although there is some evidence that the ion may affect thrombin formation.

pp. 622

"Chronic Poisoning. Chronic fluoride poisoning is a public health problem. It occurs in several sections of the U. S. where the fluoride content of the water is unusually high.-----Growth is retarded, the estrus cycle and reproduction are inhibited, and histological changes occur in the pituitary and thyroid glands. The most significant finding, however, is in the teeth.

"Mottled Enamel. Black and McKay (1916) were the first to report a dental imperfection which they termed "mottled teeth". They recognized this affliction to be endemic and in later publications McKay (1918-1925) came to the conclusion that mottled teeth were related to the water supply.

"The mechanism by which fluorides cause dental imperfection is not clear. It is estimated that the daily ingestion of 0.1 to 0.15 mgm of fluoride per kg of body weight during the time that enamel of the permanent teeth is being laid down will lead to imperfections. It is known that fluorides will interfere with normal calcium metabolism but the amount cited is insufficient to cause noticeable disturbance in the calcium balance. Neither does the feeding of calcium prevent this condition. DeEds (1936) concluded, therefore, that the action of fluoride on enzymes is the basic cause for the dental defects. He believes the action to be one on phosphatase and has demonstrated that low concentrations of fluoride decrease the activity of bone phosphatase.

"There are no official fluoride preparations. Sodium fluoride and sodium fluosilicate (Na_2SiF_6) are the salts commonly used as insecticides. There is no established therapeutic use for fluoride. At one time it was used as a food preservative but the ion is much too toxic to be employed for this purpose."

"Mechanism of Germicidal Action. The oldest theory as to the mechanism of germicidal action of chlorine is that the element reacts with water to liberate nascent oxygen and thus destroys bacteria by oxidation.

"Germicidal Efficiency. Elemental chlorine is one of the most potent of germicidal agents. The concentration of chlorine necessary to kill most organisms in from 15 to 30 seconds varies between 0.10 to 0.25 parts per million.----- It is generally considered that a residual chlorine content of 0.2 to 0.4 parts per million of water affords a generous margin of safety." pp. 846

"Chlorine Poisoning. Chlorine gas can be detected by subjective reactions in a concentration of 1:100,000. Twice this amount causes inconvenience. One part of chlorine in 10,000 parts of air produces marked irritation of the respiratory tract and a concentration of 1:1000 is fatal after five minutes of exposure."

"Because of its chemical reactivity, it is a simple matter to protect from chlorine by the use of gas masks." pp. 711