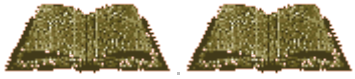
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Book Reviews: Technical Books Section



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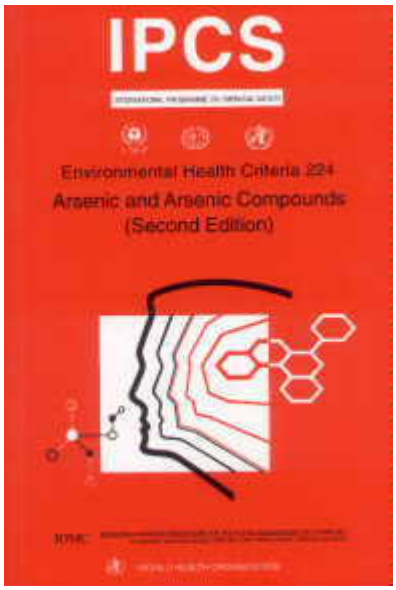
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TOXICITY OF ZINC EXPLAINED

Zinc, 1st Edition, (Environmental Health Criteria 221), International Programme on Chemical Safety

World Health Organization, Avenue Appia 20, 1211 Geneva 27, Switzerland, Publication Date 2001, xxiv + 360 pages, ISBN 92 4 157221 3, ISSN 0250-863X, NLM Classification: QD 181.Z6: Price: Sw.fr. 48.00 Sw.fr. (33.60 for developing countries).

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The book under review is one of a series of monographs brought out by the World Health Organization regularly since 1976 when the first volume on mercury was released. Following the establishment of the WHO Environmental Health Criteria (EHC) Programme in the early seventies, it was decided to sponsor research for estimating the toxicity of various metals and elements hazardous to man. Sponsorship is jointly undertaken by the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), and the World Health Organization (WHO), within the framework of the Inter-Organization Programme for the Sound Management of Chemicals. Together, these three organizations have evolved the International Programme on Chemical Safety (IPCS), the primary objective of which is the assessment of risks to human health and environment from exposure to chemicals so that steps can be taken to minimize the hazards.

The EHC Programme has already produced monographs on more than 200 toxic chemicals, which are extremely popular with toxicologists and are widely consulted throughout the world. The book under review follows the general format that has been established, and represents the joint effort of a distinguished team of experts.

...Zinc constitutes one of the important trace elements in the human body. It occurs in nature only in the divalent state. Commercially, sphalerite (ZnS) is the most important ore mineral and the principal source of the metal for the zinc industry. In 1994, world metal production of zinc was 7,089,000 tonnes and zinc metal consumption amounted to 6,895,000 tonnes!...

Zinc constitutes one of the important trace elements in the human body. It occurs in nature only in the divalent state. Commercially, sphalerite (ZnS) is the most important ore mineral and the principal source of the metal for the zinc industry. In 1994, world metal production of zinc was 7,089,000 tonnes and zinc metal consumption amounted to 6,895,000 tonnes!

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Zinc is widely used as a protective coating for other metals, in dye casting and the construction industry, and for alloys. It is a constituent of alloys such as brass. Other uses of this metal include the following: currency coins (zinc alloy, usually with copper), galvanized cans or utensils, metal toys (zinc metal), soldering, dry cell battery (zinc chloride), wood preservative, mordant for dyes (zinc sulfate i.e., white vitriol), pigment (zinc oxide, zinc dichromate), talcum powder (zinc

stearate), pesticide (zinc phosphide, zinc cyanide), vitamin syrups & supplemental foods (elemental zinc). Zinc gluconate (in the form of lozenges) is reputed to reduce the duration of symptoms of the common cold.

Since zinc is an essential element for humans, unlike lead, mercury or arsenic, care must be taken to ensure minimum intake while at the same time minimizing exposure to high concentrations. This fact is stressed by the authors who in fact conclude that since zinc is only slightly toxic, normal, healthy individuals not exposed to zinc in the workplace are at potentially greater risk from the adverse effects associated with zinc deficiency than from those associated with normal environmental exposure! Zinc deficiency can result in impaired neuropsychological functions, growth retardation, delayed wound healing, immune disorders, and dermatitis.

...the main part of the book deals extensively with the properties of zinc, occurrence and sources, distribution in the environment, patterns of human exposure, kinetics and metabolism (in laboratory animals as well as humans), health effects, and finally, analytical procedures to detect the poison in various kinds of samples...

The authors recommend a daily dietary intake of total zinc in the range of 5.6-10 mg/day for infants and children aged 2 months to 11 years, 12.3-13.0 mg/day for children aged 12 to 19 years, and 8.8-14.4 mg/day for adults. If the exposure far exceeds this, toxic manifestations begin to occur. Instances of acute poisoning are rare, but there are reports of gastrointestinal distress associated with high concentrations of zinc in drinks. Contact dermatitis has been reported following use of shampoos containing zinc pyrithione. Elevated levels of zinc can induce copper deficiency. Inhalation exposure to zinc chloride following the military use of "smoke bombs" has been reported to result in interstitial oedema, interstitial fibrosis, pneumonitis, and bronchial mucosal ulceration. But the most commonly associated syndrome with occupational zinc exposure is "metal fume fever." While this syndrome has also been reported in the case of several other metals, it is zinc which is responsible for most of the cases reported in literature. Symptoms include fever, chills, muscle aches, fatigue, and dyspnoea.

All these have been dealt with at length by the authors who must be commended for packing comprehensive, vital information relating to this very important metal in a small and compact volume. The book follows the customary format of EHC monographs, and begins with a preamble that introduces the reader to the origins of the WHO-EHC Programme and its objectives. This is followed by a summary that sums up the salient information contained in the book, which serves as a very useful overview.

As in the case of the other monographs, the main part of the book deals extensively with the properties of the metal (in this case, zinc), occurrence and sources, distribution in the environment, patterns of human exposure, kinetics and metabolism (in laboratory animals as well as humans), health effects, and finally, analytical procedures to detect the poison in various kinds of samples. The book concludes with useful recommendations for future research, and an exhaustive list of references. Taking everything into account, this monograph must be accorded the status of an authentic reference source on the toxicological aspects of zinc, and should necessarily find a place in every toxicology laboratory, medical college, and hospital in the country and elsewhere.

Including some simple illustrations and (black and white or colour) photographs in subsequent editions would be an added asset. The book may also benefit from a hard cover to enhance durability.



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Dr.V.V.Pillay has been in the vanguard of the movement among medical professionals in India to develop the neglected field of Toxicology. He has published extensively in both the scientific and lay press on matters relating to Toxicology, as well as his chosen discipline - Forensic Medicine. Dr.Pillay has authored 6 books on Forensic Medicine and Toxicology, and has received an award for one of them (Modern Medical Toxicology), generally considered to be a trend setter among books on the subject in India. He has reviewed several books on Toxicology for the Internet Journal of Forensic Medicine and Toxicology. Dr.Pillay received a scroll of honour in appreciation of work done in the field of Toxicology from the Medicolegal Society, All India Institute of Medical Sciences, New Delhi. He has established a state-of-the-art Poison Control Centre, recognized by the World Health Organization at the institute where he is currently employed (AIMS, Cochin). Among his most sought-after publications is a 700 page reference work on Toxicology.

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