Environmental Health Criteria 10

Carbon disulfide

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World Health Organization

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

ENVIRONMENTAL HEALTH CRITERIA 10

CARBON DISULFIDE

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NOTE TO READERS OF THE CRITERIA DOCUMENTS

While every effort has been made to present information in the criteria documents as accurately as possible without unduly delaying their publication, mistakes might have occurred and are likely to occur in the future. In the interest of all users of the environmental health criteria documents, readers are kindly requested to communicate any errors found to the Division of Environmental Health, World Health Organization, Geneva, Switzerland, in order that they may be included in corrigenda which will appear in subsequent volumes.

In addition, experts in any particular field dealt with in the criteria documents are kindly requested to make available to the WHO Secretariat any important published information that may have

inadvertently been omitted and which may change the evaluation of health risks from exposure to the environmental agent under examination, so that the information may be considered in the event of updating and re-evaluation of the conclusions contained in the criteria documents.

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ENVIRONMENTAL HEALTH CRITERIA FOR CARBON DISULFIDE

A WHO Task Group on Environmental Health Criteria for Carbon Disulfide met in Prague from 13 to 20 June 1977. Dr M. El Batawi, Chief Medical Officer, Office of Occupational Health, opened the meeting on behalf of the Director-General and expressed the appreciation of the Organization to the Government of Czechoslovakia for kindly acting as host to the meeting. In reply, the Group was welcomed by Professor J. Teisinger, Institute of Hygiene and Epidemiology, Prague. The Task Group reviewed and revised the second draft criteria document and made an evaluation of the health risks from exposure to carbon disulfide.

The first draft of the criteria document was prepared by Dr. Djuric, Institute of Occupational and Radiological Health, Belgrade, Yugoslavia, in consultation with Professor Teisinger, Dr E. Lukas, Institute of Hygiene and Epidemiology, Prague, Czechoslovakia, and several research workers in Belgrade and Prague. The second draft was prepared by Dr S. Hernberg, Institute of Occupational Health, Helsinki, Finland taking into consideration comments by Professor K. Freundt, Institute of Toxicology and Pharmacology, Mannheim, Federal Republic of Germany, Professor Sh. Goto, Osaka University, Japan, Dr. I. Lancranjan, Institute of Hygiene and Public Health, Clinic of Occupational Diseases, Bucharest, Romania, Dr J. Lieben of the American Viscose Division, PM Corporation, Philadelphia, USA, Dr A. Massoud, National Research Centre, Cairo University, Egypt, Dr A.M. Seppäläinen, Institute of Occupational Health, Helsinki, Finland, and Dr P. G. Vertin, Institute of Social Medicine, Catholic University of Nijmegen, Netherlands.

The Secretariat wishes to acknowledge the collaboration of these experts and, in particular, to thank Dr Djuric and Dr Hernberg for their valuable help in all phases of the preparation of the document, and Dr H. Nordman, Institute of Occupational Health, Helsinki, Finland, for his assistance in the scientific editing.

This document is based primarily on original publications listed in the reference section but much valuable information has also been obtained from various publications reviewing the toxicity and health aspects of carbon disulfide including those of the US National Institute of Occupational Safety and Health (NIOSH, 1977) and Brieger & Teisinger, ed. (1966). In addition, much useful data has been drawn from reports of several international symposia and meetings including: Zbornik radova o toksikologiji CS_2, Yugoslavia, Loznica, 3-5 June 1965; the II International Symposium on the Toxicology of Carbon Disulfide, Yugoslavia, Banja Kovilijaca, 25-28 May 1971; the III International Symposium on the Toxicology of Carbon Disulfide, Egypt, Cairo and Alexandria, 4-9 May 1974; and the IV International Symposium on Occupational Health in the Production of Artificial Fibres, Finland, Helsinki and Valkeakoski, 6-10 June 1977.

Details of the WHO Environmental Health Criteria Programme including some terms frequently used in the documents may be found in the general introduction to the Environmental Health Criteria Programme published together with the environmental health criteria document on mercury (Environmental Health Criteria 1, Mercury, Geneva, World Health Organization, 1976), now also available as a reprint.

The following conversion factor has been used in this document:

carbon disulfide	1 ppm = 3.12 mg/m^3

When converting values expressed in ppm to mg/m^3 the numbers have been rounded up to 2 or, exceptionally, 3 significant figures. Where concentrations were expressed as ppm in the original publication, this value has been given in parentheses together with the converted value.

1. SUMMARY AND RECOMMENDATIONS FOR FURTHER RESEARCH

1.1 Summary

1.1.1 Uses and sources of exposure

By far the most important use of carbon disulfide in industry is in the production of viscose rayon fibres. It is also used, to some extent, as a solvent in various industrial processes including the refining of paraffin and petroleum, and more recently in the production of flotation agents and herbicides. However, the risk of being exposed to high concentrations[a] of carbon disulfide during these processes is small compared with that in the viscose industry. Viscose rayon fibres are used in the production of rayon filament textile yarn, rayon tire yarn, rayon stable fibre and Cellophane film. In these processes, carbon disulfide exposure occurs concomitantly with exposure to hydrogen sulfide. The amounts of carbon disulfide and hydrogen sulfide vapour liberated depend on the process. For every kilogram of viscose used, about 20-30 g of carbon disulfide and 4-6 g of hydrogen sulfide will be emitted. About 0.6-1.0 kg of viscose is used per hour in the different processes involved in the production of textile yarn. However, exposure to carbon disulfide is usually highest in connection with the production of staple fibre and Cellophane, where the equivalent amounts of viscose used are approximately 70-100 kg and 1800-2000 kg per hour, respectively.

1.1.2 Populations at risk

Carbon disulfide is a typical industrial toxic chemical and exposure is almost exclusively confined to occupational situations. In theory, any worker engaged in processes using carbon disulfide may be exposed to some degree. However, in practice, only workers in the viscose rayon industry are exposed to concentrations high enough to have deleterious effects on health. The exposure of the general population living in the vicinity of carbon disulfide-emitting industries cannot be assessed at present, because information is inadequate.

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a Throughout the document the word concentration refers to mass