

TOXICOLOGICAL INFORMATION

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ABSTRACT

The need for toxicological data in the assessment of risks from toxic chemicals and for a proper interpretation of the results of toxicological experiments is discussed. It is emphasized that toxicological information should indicate the kind and grade of the risk involved and at least point to the way in which to make the risk smaller. The importance of proper categorization of toxic substances is stressed and for this purpose the Toxicity Coding Scheme is recommended.

Since the end of the Second World War the production of the chemical industry has approximately doubled every ten years, while the number of known chemical substances has risen from about one million in the 1950s to about four million today. Over 30 000 chemical substances and about 100 000 preparations are on the market in developed countries today. With the number of exposed persons continually rising and the number and amount of substances continuing to grow, a higher occurrence of diseases caused by chemical influence (I would dare to recommend for them the term chemogenic diseases), must be expected. The number of intoxications today practically equals the number of traffic accidents, a major part of them being, of course, more or less intentional. However, considering the role of growing exposure in the etiology of the diseases which are generally not regarded as intoxications (allergy, cancer etc.), the apprehension of many futurologists would not seem unreasonable.

This situation has led to a disparity between the supply of, and demand for, toxicological information, despite the great efforts made during the preceding period. New toxicological laboratories and institutes, new toxicological societies and journals are coming into existence, and the stockpiles of toxicological data are rapidly mounting. The section Toxicology in Chemical Abstracts is now about twenty times greater than it was ten years ago. However, the funds spent on toxicological investigation in the chemical industry, with the exception of the pharmaceutical industry, hardly exceed one per cent of the amount spent on chemical and technological research.

From the point of view of industrial toxicology - and this in most cases is the basis for environmental toxicology - the toxic properties and mode of action of 1 000 to 3 000 or possibly 4 000 more common chemicals are rather easy to find

in certain books, of which Patty in English and Lazarev in Russian and several translations seem to be the best known and used. Patty's book lists about 1 800 substances, and Lazarev's about 2 000, while some 1 600 substances are identical in both of them. In preparing a new edition of my book, I could collect information on about 4 000 substances of certain importance, while a little more than 2 800 substances were listed in the first edition (1964). Basic data (mostly LD-values) on more than 20 000 chemicals are included in the Registry of Toxic Effects of Chemical Substances of the United States National Institute for Occupational Safety and Health, and it is estimated that toxicological data on nearly 100 000 substances – mainly pharmaceuticals and pesticides – are scattered over various medical and chemical periodicals and unpublished research reports. A considerable amount of information is available from several computerized systems, while a notable contribution has been made by the International Occupational Safety and Health Centre of the International Labour Organization. Last but not least, the comparatively new International Register of Potentially Toxic Chemicals is progressing nicely, because as a part of the United Nations Environment Programme it has the very great advantage of an extremely broad international basis.

To summarize the present situation: about one per cent of all known chemical substances have some industrial importance; toxicological information on only about one per cent of these industrially produced substances is comparatively good and easily available, on about ten per cent it is not quite sufficient, and on about forty per cent it is very fragmentary; while information on the effects of the remaining half of the important chemicals and on about ninety-nine per cent of currently known substances is either lacking or inaccessible.

One other disagreeable aspect of the present situation must be emphasized: toxicological information on most substances exists only in the form of scientific papers. Even for an expert it is sometimes very difficult to interpret the results of certain experiments and analyse and evaluate the relevant data. For many of those seeking information, "raw" toxicological data are very little or no use. In order to become applicable to different areas of concern, they must be evaluated, transposed on to different levels of communicability, and translated into suitable terminology. In the minds of most laymen and in the minds of many managers, lawyers and lawmakers, the division of substances into toxic and non-toxic, into dangerous and harmless or into carcinogenic and not carcinogenic ones seems to be very deep-rooted and the questions these people ask are mostly uncomfortably forthright. In order to answer these questions, to give a concise characterization of a substance, to point to the risks of different chemicals or processes, or to delimit the individual groups of compounds and preparations which necessitate preventive measures, we need certain standards. In most cases, we need not aim at perfect definitions; it is sufficient to establish satisfying criteria and determine conventional dividing lines. I have tried to do this for certain effects, and what is called the Toxicity Coding Scheme has been developed. Nearly 4 000 substances and a number of preparations have thus been classified and their classifications encoded.

The Toxicity Coding Scheme (TCS) as well as any other project of this kind could serve, at best, only as a suggestion or as a basis for further discussion. Definitions, criteria and classifications can really be useful only if they are developed by a reputable expert team, sponsored by influential organizations, recommended, and broadly accepted. The fact that the economic and political effects of toxicology are rapidly growing makes the situation even more difficult. A vast number of concepts and words have not the same meaning everywhere. We should try, for instance, to remove the term "carcinogen" from this sad and dangerous list of ambiguous words.

Most problems of toxicological information can be solved only by international co-operation. An international division of labour and international agreements concerning the criteria to be used when evaluating, comparing, classifying, listing, producing, transporting, exporting and importing chemical substances and preparations, have become a necessity. The assistance of all states or groups of states should be asked, and co-operation should never be denied. Toxicological information should not be kept secret for commercial or other reasons, nor should toxicological information be distorted. It should indicate the kind and grade of the risk involved and at least point to the way in which to reduce the risk telling in appropriate words not less and not more than the naked truth. There already exists a good basis for co-ordinated international action in this respect, i.e. the Medicchem and Permanent Commission, the International Labour Organization, the World Health Organization and United Nations Organization. Any activity in this field deserves fullest and widest general support.