

Elements of Industrial Toxicology

short-term acute exposures only)

It is quite possible that actual long-term chronic exposures to a substance could prove highly toxic even though short-term exposure tests indicate a low order of toxicity

Brown states that measurements of relatively crude physical effects—such as body and organ weight changes, anatomical changes, and lethal results—are usually involved in tests of toxicity To assess the subtle effects a chemical may have, consideration must be given to measuring central nervous system effects during toxicity testing

Animal experiment data are difficult to interpret and apply to human exposure Such data are valuable *only* as guides to be used by the industrial toxicologist in estimating the gross toxicity of a substance and as leads for further investigation

Hygienic Air Quality Standards

It is from a variety of sources—including animal experiments, laboratory studies on humans, plus field and in-plant investigations of exposures—that the two prevailing concepts for expressing safe concentrations (threshold limit value and acceptable concentration) have been taken

The concept that there are concentrations of air contaminants to which nearly all workers may be repeatedly exposed without discomfort or ill effect is fundamental to the practice of industrial hygiene

These levels of air contamination are used as guides in the evaluation of health hazards

Threshold limit values

The American Conference of Governmental Industrial Hygienists (ACGIH) adopts a list of threshold limit values (TLV) each year for more than 450 substances

These TLV's are expressed as parts of vapor or gas per million parts of air by volume (ppm) at 25 C and 760 mm Hg pressure or as approximate milligrams of particulate per cubic meter of air (mg/cu m) Mineral dusts are expressed as millions of particles per cubic foot (mppcf) based on impinger samples counted by light field techniques (The index of exposure to asbestos and quartz can also be calculated on a mass per unit volume basis, i.e., mg/cu m—see Table 42-B)

Table 42-B lists the threshold limit values

of air-borne contaminants for 1968

The preface of this TLV list states that nearly all workers may be repeatedly exposed to the level in this list without adverse effect Certain values in this list preceded by a capital "C" should not be exceeded The basis for the TLV's may be reasonable freedom from irritation, narcosis, nuisance, or impairment of health Some substances have the designation "skin" This refers to a potential contribution to the overall exposure by absorption through the skin or mucous membrane

A TLV of 15 mg/cu m or 50 mppcf is recommended for inert or nuisance particulates which are not listed in the table

When extremes of temperature or pressure are encountered, the TLV values should be adjusted to take into account the added stress

The preface to the TLV list further states that these limits are intended for use in the field of industrial hygiene and should be interpreted and applied only by persons trained in this field It emphasizes that they are not intended for use or for modification for use

- 1 As a relative index of toxicity by making a ratio of two limits,
- 2 In the evaluation or control of community air pollution or air pollution nuisances,
- 3 In estimating the toxic potential of continuous uninterrupted exposures, and
- 4 As proof or disproof of an existing disease or physical condition

As stated in Appendix C to the list of TLV's, the test factors to be used for assigning limiting "C" values may be used to determine permissible excursions for the time-weighted average TLV's

Acceptable concentrations

The American Standards Institute publishes the Z37 series of Acceptable Concentrations (AC) for a number of substances (See Fig 42-2, "The Meaning of Acceptable Concentrations")

The ASI Z37 Committee has developed a number of innovations in concept In the past, a standard was conceived as a single limit, threshold, or a boundary between what is not and what is healthful But there is no such single boundary, the pattern of exposure in space and time may be variable There-