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Laboratory Safety

Virtually every teaching and research laboratory conducting studies in the natural sciences does so with some measure of risk to personnel. The principal hazards vary from field to field, but there is a widespread use of chemicals, some of which are toxic. Fortunately, the dangers can be minimized if some simple techniques are followed. The procedures are discussed at length in a new report of the National Research Council (NRC). Highlights of the report are presented (page 777) in this issue of *Science*.

At one time chemists were often exposed to many chemicals. This was particularly true in academic institutions, where the halls of chemistry buildings usually reeked. But times are changing, and chemistry departments in many universities are cleaning up their act. In this effort they are years behind the major chemical companies. I have visited chemical laboratories in five major companies and in none of them could I detect odors of chemicals. The reason was proper ventilation; chemical operations involving volatile substances were conducted in hoods. Besides exposure through the respiratory system, chemicals can enter the body through the skin or the mouth. Use of gloves and protective clothing can minimize entry through the skin. Personal hygiene, avoidance of mouth pipetting, and use of common sense can prevent entry through the mouth.

Among academic chemists, awareness of potential hazards is leading to changes in laboratory practices both in research and in classwork. Use of properly functioning hoods is becoming more widespread. Student experiments are being changed to use smaller amounts of reagents and to avoid use of toxic chemicals. Substances such as benzene and carbon tetrachloride are disappearing from reagent shelves. Safety officers are being designated to monitor practices in laboratories. Lectures on chemical hazards are being given, and examinations are including questions on safety. In other laboratories, where nonchemists are working, there are fewer facilities for coping with chemical hazards. Means of ventilation, and particularly hoods, are sometimes inadequate. There is also often less knowledge about the toxic properties of various substances.

In the current climate of litigiousness, all organizations dealing with chemicals face dangers of costly suits. These can be minimized if prudent practices are implemented. At present, uniform regulations do not exist, but the Occupational Safety and Health Administration (OSHA) is likely to issue regulations to laboratories soon. Federal and state-supported laboratories are exempt from standards mandated by OSHA and will formulate their own, often differing, regulations. However, OSHA standards will doubtless influence others.

In formulating its policies, OSHA has been constructively influenced by the NRC report. In turn, the motivation for preparing the report was what scientists perceived as a threat to scientific research in this country.* Starting in 1977, OSHA had begun to engage in controversial activities and examples of misuse of its power emerged. The quality of information released by OSHA at that time indicated an absence of competence in the agency to deal with chemical matters. Moreover, the top administrator, Eula Bingham, did not respond to offers of assistance from Philip Handler, the president of the National Academy of Sciences. Scientists feared that unrealistic regulations would be promulgated. In particular, there was concern that OSHA would impose on university laboratories the kinds of regulations that would be issued for production plants where workers are exposed to a chemical 40 hours a week, year after year.

An OSHA comment in the *Federal Register* on 22 January 1980 indicates that the agency now recognizes that there may be a difference between university laboratories and production plants. When OSHA publishes its regulations scientists can determine how much the agency has learned during the past 4 years. If it has improved its posture, at least part of the credit will be due to the NRC report.—PHILIP H. ABELSON

*P. H. Abelson, *Science*, 13 October 1978, p. 139.