erences. Professor Zvi Szafran and associates at Merrimack College discuss The 'Microscale inorganic laboratory: Safety, economy and versatility' giving the economic aspects of microscale laboratories in considerable detail, with 12 references. On this area the final paper, 'Coordination of introductory microscale inorganic and organic chemistry laboratories', presented by Dr Ronald M. Pike and associates with input from Dr Dana Mayo, discusses the planning and supervision os that inorganic laboratories can be of assistance to organic laboratories, and vice versa. Several examples of this cooperation are cited, among the 16 references given.

The most important function of a separate booklet of this type is to permit persons with specific interests to obtain the equivalent of being in the audience without the travel, time and living expenses associated with a national meeting. It is hoped more texts of this type, specialized in the style but highly authorative, will be forthcoming to diffuse knowledge which otherwise would have been difficult to share.

The booklet is recommended for anyone (administrator, supervisor, training associate or chemist) who is involved in planning and operating microscale chemical laboratories. Dr Ruth Hathaway, as organizer and chair of the symposium, is also to be commended for an excellent document.

HOWARD H. FAWCETT

Safety and Health for Engineers, by R.L. Brauer, Van Nostrand Reinhold, New York, NY, 1990, ISBN 0-442-21125-2, 651 pp, $93.00.

This volume is authored by a professional engineer at the University of Illinois and the U.S. Army Laboratory. It is concerned with the relatively meager background knowledge many engineers and other professionals have at hand on health, safety and legal aspects, and the necessity for a more complete understanding of injury prevention, theory and practice. While laws and regulations continue to increase concerns (and often confusion), the cost-effective and competitive positions can be ignored only at significant moral, legal and economic risk. Fundamental concepts are introduced early in the volume, and clearly define the importance of these often neglected aspects of engineering and management.

The volume provides excellent orientation for the engineer and others in subjects often ignored or as yet unrecognized. For example, one of the 38 chapters deals with biohazards and "sick-building syndrome" and what the engineer should know to cope with the hazard. ("Sick-building syndrome" is defined as an illness when more than 20% of the occupants report illnesses as building-related.) Another chapter discusses human behavior and performance in safety, where job safety analysis, risk-taking behavior, and even biorhythms ("Is this may day?") must be considered when designing for human occupancy and continued operations. Other chapters introduce the reader to electrical safety, chemical hazards including toxicity, explosives, material handling, pressure vessels, both ionizing and non-ionizing radiation, and the need to monitor to ensure that human health and welfare (both short-term exposures and long-term chronic effects) will be within recognized "safe limits". Industrial hygiene is an approach which requires both engineering and supervisory skills modified to the workplace or laboratory if it is to be truly effective, and achieve its objective.

Each chapter is followed by a list of questions and exercises, suitable for use in instruction. Diagrams and figures are unusually clear and specific. References are many, and in general updated. This excellent book deserves serious attention by both engineers, other specialists and management, but especially by all who wish a sensible review of the current hazard scene as seen by industry and the public.

HOWARD H. FAWCETT

Plant Design for Safety: A User-friendly Approach, by Trevor Kletz, Hemisphere Publishing Corporation, New York, NY, 1991, ISBN 1-56032-068-0, 167 pp.

Trevor Kletz has written another gem. It's truly amazing how many useful common sense approaches he has been able to condense into such a readable form. The author discusses characteristics of "safer plants" based on experiences gained from previous case histories of disasters, as well as several of his earlier publications. The main characteristics include:

1. Intensification – reduce inventories (what you don't have, can't leak).
2. Substitution – replace hazardous materials/processes with safer ones.
3. Attenuation – use hazardous materials under the least hazardous conditions (i.e. lower temperatures, lower pressures, more stable states, etc.).
4. Simplification – minimize the number of processing steps and pieces of equipment; thus reducing things that can go wrong.

He states that: "The essence of the inherently safer approach to plant design is the avoidance of hazards rather than their control by added-on protective equipment." The author draws examples from a number of commercial chemical processes to illustrate his points, such as: small well-mixed reactors replacing large stirred tank reactors in the production of nitroglycerin; adipic acid reactors with internal cooling coils rather than pumps and external cool-