

the most part has been chemically quantitated only in gross terms, such as total weight of particulate, weight of the benzene-extractable organic material, and the weight of a number of metals and anions such as sulfates, chlorides, and nitrates. This is not without reason, since the routine collection of masses of such data is not inexpensive and the work to date has utilized existing practical methods for both sampling and analysis.

Effects studies clearly indicate the need for aerosol studies to relate the physical and chemical properties of aerosols, as they exist in the atmosphere to biological and physical effects of atmospheric pollutants. Of immediate concern is the determination of chemical composition of particulates by size fractions, principally as these relate to biological systems. Specific examples are sulfuric acid, sulfate aerosols by gross sulfate levels, and specific chemical compounds, lead by total weight and by specific compounds, and organics by total weight and by specific compounds. Not only must sampling and analytical methods be developed to enable these studies to be done at realistic atmospheric pollution levels, but their application to field measurement is highly desirable.

Other areas of interest involve aerosols that are photochemically induced, e.g., typical Los Angeles haze, or those that occur naturally, and their relationships. Study is also needed in the broad area of gas-aerosol interactions, particularly as related to biological or physical effects. Not only is it important to know the chemical and physical bonds of pollutants in aerosols of various compositions, but it is equally important to understand how pollutants are eluted from inert particulates under various environments after they have been deposited, e.g., in the biological environment of the respiratory tract, or in the physical environment of material surfaces in relation to corrosion.

Meteorological Research

In our discussion of atmospheric chemistry, we indicated that the activation of chemical reactions by sunlight had introduced to environmental health problems the new dimension of photochemistry. The meteorological aspects of air pollution introduced the third space dimension to environmental problems, in that other environmental health disciplines are generally confined to areal distribution on the surface of man's living space. Even the areal problems of the earth-atmosphere interface are much more complex for the air environment, in that topography confuses the theoretical picture rather than dictating it in its entirety, as in stream pollution. In air pollution, we are dealing with multiple multicomponent pollution sources, injected into the base of a three-dimensional fluid. This fluid is mainly subject to the influences of the general worldwide atmospheric circulation, upon which are superimposed general and local diurnal influences, general and local topography, and the social habits of man and his works. We are interested in the interaction of air pollutants and meteorological factors, not merely in the significance of meteorological processes to air pollution.

Research to date has been primarily concerned with the interrelationship of meteorological parameters and measurements of air quality, the development of technics for forecasting stagnating air conditions conducive to the buildup of pollution (provided there are sources), and the development and field-checking of mathematical models to predict the dispersion and transport of pollution for a variety of source configurations and atmospheric conditions. Present emphasis is on the latter two areas.

Relative to air stagnation forecasting, there is a need to sharpen our abilities to superpose local diurnal and topographical effects on the general synoptic