TEXT-BOOKS OF CHEMICAL RESEARCH AND ENGINEERING.

CLOUDS AND SMOKES

THE PROPERTIES OF DISPERSE SYSTEMS IN GASES AND THEIR PRACTICAL APPLICATIONS

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FOREWORD

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With 31 Illustrations

PHILADELPHIA

P. BLAKISTON'S SON & CO.

1012 WALNUT STREET

1924

fine mist of water particles suspended in water vapour, for instance, the vapour tension of the water particles depends not only upon the temperature and pressure, but also varies with the size of the particles. It can also be modified by charging the particles electrically, or by surrounding each particle with a film of oil or with a layer of adsorbed gas.

Aerosols

Disperse systems, in which the dispersion medium is a gas or a vapour, may consist of one component—*e.g.*, a fine mist of liquid water suspended in water vapour—or of two or more components—*e.g.*, metallurgical fumes. The disperse phase may be liquid, as in cloud, mist or spray, or it may be solid, as in a dust-cloud, or a luminous gas flame.

Such familiar natural phenomena as dust, fog, cloud, mist, haze, fume, smoke, are essentially disperse systems in which a solid or liquid substance is dispersed in a gas—in most cases, the atmosphere. The use of so many different words to denote naturally or commonly occurring disperse systems, which differ in circumstance rather than in character, leads to a somewhat confused nomenclature. None of these terms is sufficiently comprehensive to include all disperse systems in gases. The term "gaseous dispersoid" suggests that the disperse phase is gaseous rather than the dispersion medium. "Aerosol" is the most satisfactory term, and is analogous to the accepted term "hydrosol," denoting disperse systems in water. Throughout this book it will be convenient to use this term and further to denote as "clouds," or "cloudy aerosols," those systems in which the particles are too large to exhibit Brownian motion at the ordinary temperature and pressure. The more highly disperse systems will be called "smokes," or "smoky aerosols."

The properties of aerosols differ in several important respects from those of disperse systems in liquids or solids. In the first place, owing to the relatively small viscosity and specific gravity of gases, the liquid or solid particles of the disperse phase tend to settle more readily from the system under the influence of gravity or centrifugal force. In the second place, the molecules