37—Industrial Hygiene

Definition of terms

The safety professional must be aware of the precise meanings of certain words commonly used in industrial hygiene if he is going to effectively communicate with other workers in this area A fume respirator, for instance, is worthless as protection against gases or vapors Too frequently, terms (such as *gases, vapors, fumes,* and *mists*) are used interchangeably Each term has a definite meaning and describes a certain state of matter which can be achieved only by certain physical changes to the substance itself

Basic to the industrial hygiene vocabulary are states of matter As defined by the American National Standards Institute, these are as follows

DUSTS Solid particles generated by handling, crushing, grinding, rapid impact, detonation, and decrepitation of organic or inorganic materials, such as rock, ore, metal, coal, wood, and grain Dusts do not tend to flocculate except under electrostatic forces, they do not diffuse in air but settle under the influence of gravity

Dust is a term used in industry to describe airborne solid particles that range in size from 0 1 to 25μ (1μ = 1/10,000 cm = 1/25,000 in) (μ is the abbreviation for micron) Dusts above 5μ in size usually will not remain airborne long enough to present an inhalation problem

Dust may enter the air from various sources It may be dispersed when a dusty material is handled, such as when lead oxide is dumped into a mixer or a product is dusted with talc When solid materials are reduced to small sizes in processes such as grinding, crushing, blasting, shaking, and drilling, the mechanical action of the grinding or shaking device supplies a source of energy to disperse the dust formed

FUMES Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals This physical change is often accompanied by a chemical reaction, such as oxidation Fumes flocculate and sometimes coalesce

A fume is formed when a volatilized solid, such as a metal, condenses in cool air The solid particles that make up a fume are extremely fine, usually less than 1 0μ In most cases, the hot material reacts with the air to form an oxide Examples are lead oxide fume from smelting, and iron oxide fume from arc welding A fume can also be formed when a material such as magnesium metal is burned or when welding or gas cutting is done on galvanized metal

Odorous gases and vapors are *not* fumes Newspaper columnists commonly misuse this term and refer to carbon monoxide as a fume

SMOKE Carbon or soot particles less than 0 1μ in size which result from the incomplete combustion of carbonaceous materials such as coal or oil Smoke generally contains droplets as well as dry particles Tobacco, for instance, produces a wet smoke composed of minute tarry droplets The size of the particles contained in tobacco smoke is about 0 25μ

AEROSOLS Liquid droplets or solid particles dispersed in air, that are of fine enough particle size to remain so dispersed for a period of time

MISTS Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing Mist is formed when a finely divided liquid is suspended in air Examples are the oil mist produced during cutting and grinding operations, acid mists from electroplating, acid or alkali mists from pickling operations, paint spray mist from spraying operations and the condensation of water vapor to form a fog or rain

GASES Normally formless fluids which occupy the space of enclosure and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature Gases diffuse Examples are welding gases, exhaust gases, and air

VAPORS The gaseous form of substances which are normally in the solid or liquid state (at room temperature and pressure) The vapor can be changed back to the solid or liquid state either by increasing the pressure