SOME PROPERTIES OF A.G.A. LABORATORIES TEST GASES

Since testing procedures must take into account the wide variety of gases used throughout the country, several typical gases have been made available at each testing station at the Laboratories. These gases are natural, manufactured, mixed, butane, propane, and 525 to 1400 butane-air gas mixtures.

Natural Gas

Natural gas, which is used for the Laboratories operations to a greater extent than the other types, is available from the local gas company. The specific gravity and heating value may vary somewhat from day to day, but usually averages 0.61 specific gravity and 1,000 Btu per cubic foot heating value. Its principal combustible constituents are ethane and methane, and it contains no inherently poisonous gases. Its burning speed is relatively slow and it is usually considered to present less explosion hazard than the other test gases supplied. It should be remembered, however, that its heating value is relatively high, so that even small leaks can present an appreciable fire or explosion hazard. The natural gas supplied has a detectable odor in explosive concentrations.

Manufactured Gas

Since no manufactured gas is directly available from utility sources, the manufactured gas employed by the Laboratories is obtained by processing natural gas at high temperatures in the presence of steam. Its specific gravity is 0.38 and its heating value is approximately 525 Btu per cubic foot. Its principal combustible constituents are hydrogen and carbon monoxide. Due to the nature of this mixture, it tends to be highly explosive when mixed with air and is toxic if inhaled in appreciable quantities. Similar to the natural gas from which it is made, Laboratories manufactured gas is not strongly odorized but can be detected when diluted with air.

Mixed Gas

Mixed gas, as its name implies, is a mixture of natural and manufactured gases. It has a specific gravity of 0.5 and a heating value of approximately 800 Btu per cubic foot. Since it is a mixture of the natural and manufactured gases previously discussed, its properties tend to fall midway between them. Sufficient carbon monoxide is present to make it toxic and necessitate caution.

Butane-Air

Butane-air gas mixtures are supplied from the Laboratories' two mixing plants. Bottled liquid butane is vaporized and mixed with a sufficient quantity of air to produce, in one plant, a gas of 1.16 specific gravity and 525 Btu per cubic foot heating value. The gas produced in the second plant is of 1.41 specific gravity and 1400 Btu per cubic foot heating value. Since all liquefied petroleum gases and their mixtures with air have a specific gravity greater than that of air, they tend to fall and gather on the floor or in enclosed spaces below burners. This tendency allows the formation of gas air mixtures of an explosive character on floors or in confined spaces. Since the gas is relatively heavy, it does not dissipate rapidly and even a small undetected leak may thus gradually cause a dangerous accumulation of explosive mixture. Liquefied petroleum gases have a sweet odor, and even when diluted with air, sufficient odor remains to enable detection of leaks under usual conditions before an explosive mixture occurs.

Liquefied Petroleum Gases

Butane gas is supplied from bottled liquid butane which is vaporized and piped to the test stations. Propane gas is supplied in 100 pound cylinders which, when in use, are kept in portable cabinets. Gaseous butane has a specific gravity

of 2.0 and a heating value of 3200 Btu per cubic foot, and gaseous propane has a specific gravity of 1.53 and a heating value of 2,500 Btu per cubic foot. These gases are of the same nature as the butane-air mixtures previously discussed, but due to the very high heating values of the undiluted gases, present even greater hazards from very small leaks.