occasionally, this gas must a priori be suspected as the main cause of the poisonings. Remaining elements can have only an inconsiderable or minor part as etiologic agents.

Hydrogen sulfide exposure is confirmed by air analyses at various places of work. The first of these investigations, in 1945, involved 107 individual places where men were at work for longer or shorter periods. It gave the following summarized results (table 2):

Less than 0.002 per cent	62 places
0.002—0.015 per cent	25 places
0.015—0.060 per cent	11 places
More than 0.060 per cent	9 places

The values above 0.002 were all found within the above-mentioned plants (*A* to *E* in chart 1). During the first investigation all values within the refinery were below 0.002, but there were several cases of poisoning here during a later period. At a new investigation it was shown that these were due to a temporary drying-up of a floor drain, hydrogen sulfide having entered into the localities from waste water containing approximately 0.2 per cent of hydrogen sulfide. The refinery has therefore been listed among the exposed plants.

TOXICOLOGY OF HYDROGEN SULFIDE

Hydrogen sulfide is a highly toxic, colorless gas, heavier than air (specific gravity, 1.19), with an offensive odor even in the very small concentration of 0.000015 per cent in air. At higher concentrations its odor changes to a not unpleasant, sweetish odor, and at a concentration of about 0.015 per cent in air it has a paralyzing effect on the olfactory nerve. It is soluble in water, one volume of water absorbing three times its own volume of the gas, and also in hydrocarbons such as gasoline, kerosene and crude oil. A mixture of two volumes of H_2S with three volumes of O_2 explodes violently when ignited.

A very sensitive qualitative test for hydrogen sulfide in air is the darkening of papers soaked in lead acetate. Quantitatively it can be determined by drawing the contaminated air at a known rate through a standard iodine solution and then titrating this with a standard solution of sodium thiosulfate (Barthelemy,[6] 1939) or by absorbing it in cadmium acetate solution and determining iodometrically the sulfur bound to cadmium. For routine work we have used a hydrogen sulfide detector which gives rapid results and is sufficiently accurate to indicate, at least semiquantitatively, concentrations in air within the range of 0.0025 to 0.05 per cent. The method (Littlefield, Yant and Berger,[7] 1935) is based on a color change reaction of activated aluminium oxide coated with silver cyanide and placed in a glass tube, through which the atmosphere to be examined is aspirated by means of a rubber bulb. The concentration is indicated by the distance of color in the tube.

Hydrogen sulfide is most frequently encountered in the production and refining of high sulfur petroleum (Sayers and others,[8] 1925) and in the manufacture of viscose rayon (Hamilton,[9] 1940).

6. Barthelemy, H. L.: J. Indust. Hyg. & Toxicol. **21**:141, 1939.

7. Littlefield, J. B.; Yant, W. P., and Berger, L. B.: Investigational Report 3276, United States Department of the Interior, Bureau of Mines, 1935.

8. Sayers, R. R., and others: Bulletin 231, United States Department of the Interior, Bureau of Mines, 1925.

9. Hamilton, A.: Bulletin 34, United States Department of Labor, 1940.