

NOTES

Intensive Drying.—One or two papers published in America record failures to obtain results which their authors expected from the drying of liquids.¹

The explanation appears to be that while expending a great deal of trouble in obtaining the liquids in the pure state, the glass of the apparatus was not sufficiently dried.

As far as can be made out from the published papers, the phosphorus pentoxide was entirely submerged in the liquid. The glass therefore obtained very little drying effect after the apparatus was sealed up. In my original experiments as described² a side tube or bulb containing phosphorus pentoxide was always introduced for the sole purpose of drying the glass while the separate drying of the liquid by phosphorus pentoxide was taking place. I have recently pointed out³ that the deep-seated moisture in glass is very difficult to remove and, in my experience, this removal to the degree necessary for these experiments is only possible by very long exposure to an atmosphere dried by phosphorus pentoxide. It is obvious that the dryness of a system is only the dryness of its wettest part.

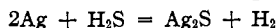
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RECEIVED DECEMBER 10, 1930
PUBLISHED MAY 6, 1931

Note on the Reaction between Hydrogen Sulfide and Mercury.—

In a recent communication [THIS JOURNAL, 52, 885 (1930)], Lilienfeld and White reported the results of a study of the reaction between hydrogen sulfide and silver, and showed that the metal is attacked by hydrogen sulfide at room temperature only in the presence of oxygen and moisture; the reaction commonly supposed to occur with the production of hydrogen, *viz.*



was found to be endothermic and not to take place at ordinary temperatures. The following observations, which show qualitatively that the reaction between hydrogen sulfide and mercury is analogous to that of the gas and silver, were noted during the preparation and purification of hydrogen sulfide in an apparatus containing several H₂S/Hg interfaces. Work to be carried out involved the measurement of pressure with a manometer, the mercury of which would be in continuous contact with pure hydrogen sulfide, hence it was necessary to determine whether any reaction took place.

¹ Lenher and Daniels, *Proc. Nat. Acad. Sci.*, 14, 606 (1928); E. Juanita Greer, THIS JOURNAL, 52, 4191 (1930).

² Baker, *J. Chem. Soc.*, 123, 1223 (1923).

³ Baker, *ibid.*, 1663 (1929).

Hydrogen sulfide, prepared by the action of dilute hydrochloric acid upon "Analytical Reagent" ferrous sulfide *in vacuo*, was passed over powdered ferrous sulfide, dried over phosphorus pentoxide, condensed in liquid air and subjected to fractional distillation. Rejected fractions were discharged at open mercury surfaces, which soon became coated with sulfide. A sample of the pure gas finally obtained was sealed up in contact with pure mercury for three months. No trace of blackening of the surface could be seen, but at the end of this period the introduction of a trace of moist air into the tube caused the mercury surface to be covered with a black film in a few hours.

Ample confirmation of the immunity of mercury from attack by hydrogen sulfide free from air and moisture was evident as the work progressed; the gas could be safely stored in tubes over mercury, and pressure measurements could be carried out without risk of contamination of the meniscus.

In their paper Lilienfeld and White mentioned that phosphorus pentoxide could not be used to dry hydrogen sulfide as it oxidized the gas to sulfur dioxide. To investigate this point the tests employed by these authors were used in an examination of the gas prepared as described. Analyses of samples of the gas showed sulfur dioxide to be absent, while no sulfur residue was left by the evaporation of a carbon disulfide extract of the contents of a phosphorus pentoxide tube through which about 25 liters of gas had passed.

It is probable that the phosphorus pentoxide used by the American workers contained lower oxides of phosphorus, which were responsible for the oxidation of the hydrogen sulfide. The drying agent used in this work was tested according to the method described by Whitaker [*J. Chem. Soc.*, 127, 2219 (1925)], and was found to be free from lower oxides.

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RECEIVED FEBRUARY 24, 1931
PUBLISHED MAY 6, 1931

The Construction of a Flexible Glass Diaphragm for a Clicker Gage.—The utility of the glass clicker gage for measuring pressure changes in gas reactions has been emphasized by several investigators, in particular D. F. Smith and W. W. Taylor.¹ The essential part of this gage is the glass diaphragm. It must be strong enough to withstand a considerable pressure difference on the two sides, thin enough to have high sensitivity, and must click audibly at a definite pressure difference. As Smith and Taylor point out, the construction of a good diaphragm is very tedious. The following method is simpler and requires fewer trials to make a satisfactory diaphragm.

¹ Smith and Taylor, *THIS JOURNAL*, 46, 1393 (1924).

A thin glass bulb is blown at the end of a 3-mm. tube in the usual manner, but just before it becomes rigid it is squeezed lightly by a U-shaped piece of spring brass. This operation forms a banjo-shaped bulb. The flattened sides possess concentric corrugations which give superior clicking characteristics to the diaphragm. Usually only one side clicks well. However, in case there is confusion because both sides click near the same pressure difference, one of them can be heated until the corrugations are destroyed.

CONTRIBUTION No. 56 FROM THE
EXPERIMENTAL STATION OF
E. I. DU PONT DE NEMOURS AND COMPANY
WILMINGTON, DELAWARE
RECEIVED MARCH 28, 1931
PUBLISHED MAY 6, 1931

RALPH NESTER

[CONTRIBUTION FROM THE PHYSICO-CHEMICAL LABORATORY OF THE NEW YORK STATE
AGRICULTURAL EXPERIMENT STATION]

THE MOLECULAR WEIGHT OF CASEIN. III¹

BY D. C. CARPENTER

RECEIVED SEPTEMBER 16, 1930

PUBLISHED MAY 6, 1931

In the two previous papers of this series, Svedberg, Carpenter and Carpenter² have described their experiments dealing with the determination of the molecular weight of casein by use of the ultracentrifuge. Casein prepared either by the method of Hammarsten³ or the method of Van Slyke and Baker⁴ was shown to consist of a mixture of protein molecules of different molecular weights. Furthermore, different specimens prepared by the latter method were shown to consist of different mixtures.

By extracting Hammarsten casein with warm acidified alcohol we have separated a protein which behaved as a monomolecular substance and which had a molecular weight of 375,000. This was found to constitute about 30% of the crude Hammarsten casein. The other chief constituent of crude casein was studied in several samples of Van Slyke and Baker casein and it was shown that the molecular weight of this constituent lay between 75,000 and 100,000.

That the protein of molecular weight between 75,000 and 100,000, the one of 188,000 and the acid-alcohol soluble one of molecular weight 375,000 are separate and distinct species has been shown by the serological studies of Carpenter and Hucker.⁵

This paper deals with the estimation of the molecular weight of the

¹ Read before the Meeting of the American Chemical Society at Cincinnati, Ohio, on September 9, 1930.

² Svedberg, Carpenter and Carpenter, *THIS JOURNAL*, **52**, 241, 701 (1930).

³ Hammarsten, "Handbuch der biochemischen Arbeitsmethoden," E. Abderhalden, Berlin u. Wien, 1910, Vol. II, p. 384.

⁴ Van Slyke and Baker, *J. Biol. Chem.*, **35**, 127 (1918).

⁵ Carpenter and Hucker, *J. Inf. Diseases*, **47**, 435 (1930).