portions of the inoculated solutions were added to 500–600 cc. of Solution 4 in 2 glass-stoppered liter bottles. The following table shows the changes in normality observed in a month's time.

TABLE III

CHANGES IN NORMALITY IN ONE MONTH'S TIME

Date	600 cc. of Soln. 4 + 1 cc. inoculated with bacteria from Soln. 1 *N*	600 cc. of soln. 4 + 1 cc. inoculated with bacteria from Soln. 2 *N*
Apr. 11	0.012934	0.012934
18	.012921	.012931
May 2	.012284	.012872
12	.011848	.012716
	Fall, 8.3%	Fall, 1.6%

During the same period the normality of the original solution, 4, decreased by 0.3%. It is evident that the decomposition is due to the action of bacteria.[8]

The authors wish to thank Dr. E. M. Twiss of Vassar College for her help with the bacteriological work.

Summary

The stability of several 0.01 *N* solutions of sodium thiosulfate has been studied over a period of 8 months.

Freshly boiled redistilled water gave a solution that was more permanent than that obtained with laboratory distilled water, ordinary redistilled water or redistilled water through which carbon dioxide-free air had been bubbled.

Carbon dioxide, oxygen or dilute sodium hydroxide had very little effect on the stability of the solution.

Decomposition is caused by the action of bacteria.

POUGHKEEPSIE, NEW YORK

NOTE

A Glass-to-Metal Joint.—In a recent note by Merle L. Dundon[1] on a glass-to-metal joint it was claimed that the method of McKelvy and Taylor[2] of platinizing, copper plating and soldering was tried without success. The failure of the joints by cracking of the glass upon cooling was ascribed to heat strains introduced by the soldering process. Heat strains may be introduced during the platinizing process, if the glass is not cooled carefully, but the temperature of melted tin is not sufficiently

[8] The organism isolated from Solution I has been identified by Selman A. Waksman, at the New Jersey Agricultural Experiment Station, as *Thiobacillus thioparus*. Its characteristic reaction is the transformation of thiosulfate into sulfate and elementary sulfur.

[1] Dundon, THIS JOURNAL, **45,** 716 (1923).

[2] McKelvy and Taylor, *ibid.*, **42,** 1364 (1920).

high to introduce permanent strains in glass. The only permanent strains introduced in soldering glass to metal joints are due to the fact that a metal with a greater expansion coefficient is shrunk on the glass by cooling. Although the soda glass used by the writer has very seldom cracked upon cooling, Pyrex glass, which has a smaller expansion coefficient, has frequently cracked unless the joint was a small one or the metal part was made very thin so that it stretched instead of cracking the glass. These facts lead one to suspect that Dundon used a glass that contained numerous heat strains originally or which had an expansion coefficient unusually small for soda glass.

The writer has made several platinized soldered joints, but has found that equally satisfactory joints can be obtained by the use of tin or low melting-point solder without platinizing the glass, a method also mentioned in the article by McKelvy and Taylor.

When joints are made without platinizing, both the glass and metal must be very clean. The following procedure has been successful. The glass is cleaned with chromic acid, rinsed with distilled water and dried; the metal part is coated with tin or solder and the surface of the melted tin cleaned with a solution of zinc chloride. The metal part is allowed to cool, is washed thoroughly with distilled water, and if necessary is scrubbed with absorbent cotton or other material free from grease or dirt, and dried. Then the two parts are held together above a flame and as soon as the tin melts, the glass is inserted in the metal without the addition of any flux. When one part is fixed on an apparatus, it may be inconvenient to use a torch, in which case a soldering copper just hot enough to melt the tin may be held to the outside of the metal part and the glass pushed in slowly as the tin melts.

One joint about 5 mm. in diameter has withstood the vapor pressure of liquid carbon dioxide (60 to 70 atmospheres) for 3 years. A joint 41 mm. in diameter, tested with a pressure difference of about 1 atmosphere, was made with a solder melting at 130°. The first attempt was a failure because the flame came into direct contact with the glass and cracked it. Success was attained in the second attempt, however, when precautions were taken to keep the flame from striking the glass. No trouble arose from the fact that the glass did not fit tightly in the metal.

The copper-plated joint mentioned by Dundon is probably satisfactory for moderate pressures, but the process of manufacture requires much more time and labor than for the soldered joint.

BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, D. C.
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Received April 6, 1923