possible agglutination, association or chemical combination caused by the added salt.

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Note on the Magnetic Susceptibility of the Manganocyanide Ion.—We had occasion to make a rough determination of the susceptibility of the manganocyanide ion. The method employed was the Gouy[1] method, so modified as to eliminate most of the pull due to the water. The upper compartment was kept filled with a solution of manganous sulfate 0.058 molal, and the lower, in the first instance, open to the atmosphere. In the second series of runs the lower compartment was filled with a solution of the same concentration of manganous ion in the presence of 2.3 *M* potassium cyanide.

The solution was so prepared as to avoid the oxidation of the manganocyanide by the oxygen of the air. This was done by using xylene for covering.

The diamagnetic susceptibility of the potassium cyanide was determined in a separate run, thus making our determination of the susceptibility of the manganocyanide independent of the impurities in the potassium cyanide. The densities of the solutions were determined to 0.1%. The sample of manganous sulfate was of high purity (containing 0.001% of iron).

Employing the values of the magnetic susceptibility for air, water and Cabrera's[2] value for manganous sulfate, we have calculated the susceptibility of the manganocyanide ion. This value, corrected for the total cyanide is 1650×10^{-6}. The presence of the sulfate was also corrected for; -37×10^{-6} was taken for its molal susceptibility.

It is to be noted that this value (1650×10^{-6}) lies between one (1300×10^{-6}) and two (3300×10^{-6}) Bohr magnetons if S levels are assumed. This is to be expected since this ion is iso-electronic with ferricyanide ion, which has a susceptibility of about 1700×10^{-6}. According to the Welo-Baudisch[3] rule, the manganocyanide $Mn(CN)_6^{----}$ (as well as the ferricyanide $Fe(CN)_6^{---}$) would have a susceptibility of one Bohr magneton. The deviation from one Bohr magneton in this case is in the same direction and same order of magnitude as in the case of the ferricyanide. However, it is possible to ascribe the deviation in our case as due to bivalent manganese

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[1] Shaffer and Taylor, THIS JOURNAL, **48**, 843 (1926).

[2] Cabrera, Moles and Marquinas, *J. chim. phys.*, **16**, 11 (1918).

[3] Welo-Baudisch, *Nature*, **116**, 606 (1925).

in other cyanide complexes, which are known to exist. The accuracy of the determination is within 5%.

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THE ACTION OF SODIUM HYDROXIDE ON CELLULOSE

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Introduction

When a sample of cellulose is steeped in an aqueous solution of sodium hydroxide, the concentration of the sodium hydroxide is diminished by an amount which depends on the temperature and the concentration. Some of the previous work on the mechanism of this interesting effect has been summarized recently by G. W. Blanco.[1] The evidence seems to favor the explanation which assumes the formation of a compound, but although many investigators agree that above a concentration of 16% the amount of caustic alkali absorbed by a given weight of cellulose is constant, the literature contains a remarkable variety of curves for the absorption from the more dilute solutions.

Cellulose is a very variable material, and the discrepancy between the results obtained by different investigators suggests that the absorption from dilute solutions may be a physical rather than a chemical process. It was, therefore, thought desirable to attempt to correlate absorption of sodium hydroxide from dilute solutions and certain physical properties of the cellulose. No results have yet been obtained from work in this direction since most of the celluloses selected for the purpose were found to be unsuitable on account of unexpected difficulties in filtration, and the present work is confined to a highly resistant cotton cellulose. The results so far indicate that there is a chemical reaction between cellulose and sodium hydroxide even when the latter is present in dilute solution. However, experiments are being continued with other varieties of cellulose, and it is hoped to deal with these in a later paper.

Description and Preparation of Materials.—The moisture content of the cotton, determined by heating to constant weight at 100°, was 6.96%, and the ash content was 0.035%. Its resistance to the peptizing action of strong alkali indicated that it was probably free from the organic impurities present in certain other celluloses, and except for a trace of ammonia no detectable amount of impurity could be removed by washing

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[1] Blanco, *Ind. Eng. Chem.*, **20**, 926 (1928).