occurs, and in about a week values close to that of the solubility product constant are obtained. This slow precipitation has been observed also in inorganic solutions. The rate of precipitation apparently depends upon how much the value of the solubility product is exceeded; *i. e.*, the rate of reaction is proportional to the free energy change (—ΔF) or driving force of the process.

Thus one might expect to find that in active rickets there exists not complete arrest of calcification, but rather a marked diminution in the rate of calcification, resulting from the diminution of the ion product in blood serum. Some observations recently made on rats by Dr. Shipley[2] indicate that this is the case. If rats are kept a sufficiently long time upon a rickets-producing diet, a fine deposition of calcium in the metaphysis is often found. Moreover in human rickets a complete arrest of calcification is seldom if ever found.

The tendency of tertiary calcium phosphate to remain supersaturated in solutions for long periods of time would seem to be of considerable biological importance. It is by this mechanism that the blood is able to hold quantities of calcium sufficient to prevent tetany.

A more detailed report of these experiments will shortly be published.

137 (2660)

A new color test for differentiating neoarsphenamine from sulfarsphenamine.

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Although sulfarsphenamine, which was first introduced clinically in France as Sulfarsenol, is closely related to neoarsphenamine, a distinct chemical difference exists between the two drugs, the former being a derivative of sulfurous acid while the latter is a derivative of the hypothetical sulfoxylic acid.

Publications of Macallum,[1] deMyttenaere[2] and others indicate

[2] P. G. Shipley, personal communication.

that more or less uncertainty exists not only in the nomenclature of these drugs but also as to their chemical characteristics. It has also been found by various investigators that the trypanocidal and curative properties to which these drugs owe their practical importance, vary with these differences in chemical structure. It is therefore of great importance to be able to definitely distinguish between these two drugs.

Voegtlin and Johnson[3] in 1922 suggested a color test for differentiating between neoarsphenamine and sulfarsphenamine. This test is based on Reinking, Dehnel and Labhardt's[4] observations that compounds containing the group -CO-SO·Na reduced indigo carmine, while the compounds containing the group -CO-SO_2·Na did not reduce the dye. Voegtlin and Johnson[3] found that an aqueous solution of neoarsphenamine will decolorize indigo carmine in a few minutes, if gently heated, yielding a yellow solution. Under the same conditions they found that sulfarsphenamine did not decolorize the dye.

A test, such as that described above, which requires heating is objectionable because of the ease with which compounds of the arseno type undergo decomposition at higher temperatures. We have also observed that some sulfarsphenamines, under the conditions described, will decolorize indigo carmine, especially when the solutions are acidified or made strongly alkaline.

We have found that by using methylene blue in place of indigo carmine, we have a reagent which gives a more specific test for differentiation of neo and sulfarsphenamine. This test, which has the added advantage of being workable at room temperatures, is carried out by adding a few drops of a ¼ per cent aqueous solution of medicinal methylene blue to a 1 per cent or stronger solution of the drug. With neoarsphenamine, the blue color of the dye is reduced in a few seconds to the colorless leuco base, whereas sulfarsphenamine fails to decolorize the dye.

Briefly summarizing our results, we have found that, under the conditions described above, methylene blue will be decolorized by:

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[1] Macallum, A. Douglas, *J. Am. Chem. Soc.*, 1921, xliii, 643; *Ibid*, 1922, xliv, 2578.

[2] de Myttenaere, F., *Bull. acad. roy. med. Belg.*, 1923, (5) iii, 258.

[3] Voegtlin, C., and Johnson, J. M., *J. Am. Chem. Soc.*, 1922, xliv, 2573.

[4] Reinking, K., Dehnel, E., and Labhardt, H., *Ber. d. deutsch. chem. Geselsch.*, 1905, xxxviii, 1069.

1. Neoarsphenamine.
2. Acid solutions of formaldehyde sulfoxylate (formaldehyde sulfoxylic acid).
3. Strongly alkaline solutions of salvarsan.

Methylene blue is not decolorized by:

1. Sulfarsphenamine.
2. Neutral or alkaline solutions of formaldehyde sulfoxylate.
3. Acid or slightly alkaline solutions of salvarsan.
4. Solutions of formaldehyde bisulfites, either acid, alkaline or neutral.

Work is now in progress on a titrametric application of this test which appears to give promise of indicating certain variations in commercial neoarsphenamines which compare favorably with certain chemical and biological characteristics of the different products.

138 (2661)

Group specific flocculation reactions with alcoholic extracts of human blood.

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In a previous communication it was stated that by adding inactivated hemolytic immune sera to emulsions of alcoholic extracts of blood, flocculation reactions can be obtained.[1]

In continuation of our experiments, tests were made with rabbit anti-human blood immune sera. It was found that in this case also a certain number of the immune sera gave positive reactions under the conditions of our experiments. The immune sera were prepared by injections of Group I and of Group II blood corpuscles (American nomenclature).[2] Some of the most active anti-group II immune sera showed a distinctly stronger flocculation with the extracts of II corpuscles than with those of Groups I and III (as shown in the table). To make the emul-

[1] Landsteiner, K., and van der Scheer, J., PROC. SOC. EXP. BIOL. AND MED., 1924, xxii, 170.

[2] *J. Am. Med. Assn.*, 1921, lxxvi, 130.