

bore and the greater its length, the smaller will be the apparent viscosity. This anomalous variation with radius (and length) is precisely that found by many investigators, and it is usually referred to as the 'sigma' phenomenon. Various explanations have been offered to account for this effect², all of which attribute it to a property of the material. Thus Ambrose and Loomis³ suggest that it is due to thixotropy, while Dix and Scott Blair⁴ claim to account for it by assuming that the streamlining layers are not infinitely thin. Other authors attribute the effect to slip at the tube wall.

It is not suggested that the 'sigma' phenomenon is wholly due to this error inherent in the viscometer, but it seems likely that in many instances both effects are present simultaneously. It is possible that in some cases apparently anomalous results can be completely accounted for by the error described, but it must again be stressed that this error can only occur with materials which show a fall in apparent viscosity with increasing shear.

This instrumental error has been eliminated in measurements made recently⁵ on rubber solutions and soap-thickened mineral oils using a simplified form of Arveson's viscometer. The results show that for these materials, provided the capillary is sufficiently long, thus reducing the 'equilibrium length' to a negligible fraction of the whole, the viscosity-shear curve is independent of capillary size.

A. C. MERRINGTON.

Horsham,
Sussex.
June 28.

- ¹ For detailed bibliography, see Scott Blair, G. W., *J. Sci. Inst.*, **17**, 7, 169 (1940).
² Scott Blair, G. W., "An Introduction to Industrial Rheology" (London: Churchill Ltd., 1938).
³ Bulkley, R., and Bitner, F. G., *J. Rheol.*, **1**, 269 (1930).
⁴ Weiler, *Ind. Eng. Chem.*, **14**, 634 (1942).
⁵ Peek and Ericson, *J. Rheol.*, **2**, 351 (1931).
⁶ Ambrose and Loomis, *Physics*, **4**, 265 (1934).
⁷ Arveson, M. H., *Ind. Eng. Chem.*, **24**, 71 (1932).
⁸ Dix, F. J., and Scott Blair, G. W., *J. Appl. Phys.*, **11**, 9, 574 (1940).
⁹ Unpublished.

Alloys of Gold with Alkali Metals

It has previously been suggested that gold alone among the heavy metals of the first column of the periodic system forms alloys with alkali metals of definite and simple stoichiometric ratio. Matthewson¹ derived from his experiments a formula NaAu_2 ; Zintl² mentioned the formation of NaAu . The discrepancy between these results is probably due to the fact that in the work of both authors oxidation or other unwanted reactions of the alkali metal were not excluded.

For the investigation of alloys of alkali metals with antimony and bismuth³, I used a simple method to determine the composition of such alloys, which had the advantage that the alloy was formed in high vacuum, thus avoiding contamination of the alkali metal. The procedure, which has been described in detail elsewhere⁴, was as follows. A known quantity of the heavy metal was evaporated on to the wall of an evacuated glass vessel. Then the alkali metal was distilled on to this metal layer until, even at the highest temperature compatible with the vapour pressure of the alkali metal, no more metal was absorbed. Finally the amount of alkali metal consumed was determined.

Using this method, I have now investigated copper,

silver and gold in combination with sodium, potassium, rubidium and caesium. The experiments confirmed that no definite reaction takes place with copper or silver. They further showed that the gold layer at first quickly absorbs the alkali metal, but during continued distillation the alkali metal is suddenly deposited as a distinct separate layer on top of the alloy layer. Determination of the amount of alkali metal used to 'saturate' the gold layer indicated that all the alloys correspond to the formula AuM , where M denotes the alkali metal. The accuracy of the experiments was only of the order ± 20 per cent, owing to the difficulty of measuring small quantities of alkali metal, but this accuracy is sufficient to exclude all simple formulæ other than AuM . To disprove the rather improbable possibility of a complicated formula, the experiments would have to be repeated with larger quantities of the metals; this would require larger vessels to avoid excessive thickness of the layers.

As was to be expected, the alloys of the AuM type are photo-electrically sensitive, but the sensitivity is too low to be of practical importance. An interesting optical property of the alloys is that, like the SbCs , alloy^{3,4}, they show no metallic lustre, and their absorption of visible light, in particular near the red end of the spectrum, decreases from sodium to caesium. The visual change from a practically opaque gold layer to the extremely transparent AuCs layer is particularly striking.

A. SOMMER.

Cinema Television, Ltd.,
London, S.E.26. July 13.

- ¹ Matthewson, *Int. Z. Metallograph.*, **1**, 81 (1911).
² Zintl, *Z. phys. Chem.*, **A**, **154**, 1 (1931).
³ Sommer, *NATURE*, **148**, 463 (1941).
⁴ Sommer, *Proc. Phys. Soc.*, **55**, 145 (1943).

Urease Activity and Ascorbic Acid

WITH reference to Mr. Elson's observation¹ that ascorbic acid at low concentrations inhibits urease activity, and that this inhibition disappears in the presence of cysteine, it is worth noting that certain polyhydric phenols, for example, catechol and quinol, also exert at low concentrations (one part in two millions) highly inhibitory effects on urease activity, this inhibition disappearing in presence of thiol compounds such as cysteine². It has been shown that the inhibition in this case is due, not to the phenol, but to the corresponding oxidized product, that is, the quinone present in solution with the phenol. The alleviating action of cysteine is due to the reduction of the quinone to the inert phenol. It may be suggested that, in an analogous manner, the toxicity of ascorbic acid in dilute solution is due to the oxidized form of ascorbic acid, namely, the diketone, present in solution, and not to the ascorbic acid itself. The effect of cysteine will be to reduce the dehydro-ascorbic acid to the inert ascorbic acid, a phenomenon which is known to take place, as shown by Crook³.

J. H. QUASTEL.

Agricultural Research Council Unit of
Soil Enzyme Chemistry,
Rothamsted Experimental Station,
Harpenden.
July 23.

- ¹ Elson, L. H., *NATURE*, **152**, 49 (1943).
² Quastel, J. H., *Biochem. J.*, **27**, 1116 (1933).
³ Crook, E. M., *Biochem. J.*, **35**, 226 (1941).