flame the globule will draw up into a form almost hemispherical but on withdrawing it from the region of high temperature the borax is observed to spread into a comparatively thin layer. The spreading is probably arrested by the increased viscosity and rigidity of the cooling mass. The bead on the wire may, somewhat less readily, be observed to undergo the same changes.

Let us consider an application of the equation of Thomas Young to the point of contact of the bead with the platinum wire. This equation reads as follows: $S_1 = S_{12} + S_2 \cos \Theta$, where S_1 is the surface tension of the solid, S_{12} is the interfacial surface tension (solid–liquid), S_2 is the surface tension of the liquid and Θ is the angle of contact of the liquid with the solid. Of course the equation cannot be applied quantitatively but the significance of a change in Θ can be estimated. Rewriting the equation as $S_1 - S_{12} = S_2 \cos \Theta$ it seems apparent that an increasing value of Θ indicates that the $S_1 - S_{12}$ difference is decreasing more rapidly that the surface tension of the liquid, or in other words the adhesion tension[1] of the borax–platinum system is decreasing with increase of temperature.

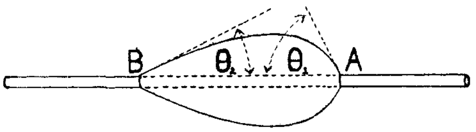

Fig. 1.

Now referring to the figure and assuming that heat is applied at A it is obvious that an increase in the contact angle Θ_1 on the hot side of the bead will tend to shorten the longitudinal dimension of the latter, causing it to swell and thereby increase the angle Θ_2 on the cool side of the bead. Furthermore, it is to be expected that the surface tension of the liquid will be lower on the hot side of the bead than on the cool side and on this account the surface layer of the drop will be drawn toward B. This will also tend to increase the angle Θ_2 except in so far as the surface movement is offset by the counter-circulation within the bead. The increase in Θ_2 at B will alter conditions at that point and if a dynamic equilibrium actually existed there, readjustment will be made by the movement of the line of contact toward the left, which will tend again to lower the magnitude of the angle Θ_2. If therefore a temperature differential is maintained between A and B, this readjustment process will be made continuous and the bead will creep along the wire from hot to cool regions. This latter is exactly what we find does occur and our analysis seems to indicate that in such a system the formation of contact angles is the result of a dynamic equilibrium of surface forces.

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[1] Freundlich, "Colloid and Capillary Chemistry," p. 157.

The Preparation of Phenyl Mercuric Nitrate

BY G. H. WOOLLETT AND V. A. COULTER

Diphenyl mercury in chloroform when shaken vigorously with aqueous mercuric nitrate solution is converted into phenyl mercuric nitrate. The entire mixture may later be dissolved in boiling alcohol for crystallization, giving a 75% yield of nearly pure material, m. p. 188° dec. The residue left after melting decomposes explosively at about 270°. The following quantities have proved to be in best proportion: $HgNO_3 \cdot 0.5H_2O$ 3.49 g., chloroform 50 cc., diphenyl mercury 3.54 g. (0.01 mole), water 3 cc. and alcohol 600 cc. The solubility of phenyl mercuric nitrate at 5° and at the boiling point of the solvent (g. per 100 cc.) is as follows: water 0.05; 0.90; alcohol 0.08; 0.51.

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An Unknown Radioactivity

BY A. V. GROSSE

Three years ago, during our unsuccessful search of an isotope of element 91 of long life,[1] we noticed in two zirconium minerals (eucolite and eudyalite from Greenland) a small α-activity, which behaved chemically identically or very like protactinium, the origin of which was difficult to account for.

In the meantime the relationship between protactinium and uranium has been definitely established and the fact confirmed that in every uranium mineral, disregarding age, origin or uranium concentration, 1 g. of uranium contains in equilibrium $2.7_8 \cdot 10^{-7}$ g. of Pa, equalling $27._9$ mg. of U_3O_8 in α-activity.[2,3]

In the minerals mentioned the amount of α-

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[1] A. V. Grosse, *Naturwissenschaften*, **20**, 505 (1932).

[2] A. V. Grosse, *Phys. Rev.*, **42**, 565 (1932).

[3] A. V. Grosse, *J. Phys. Chem.*, **38**, 487 (1934).