Letters to the Editor

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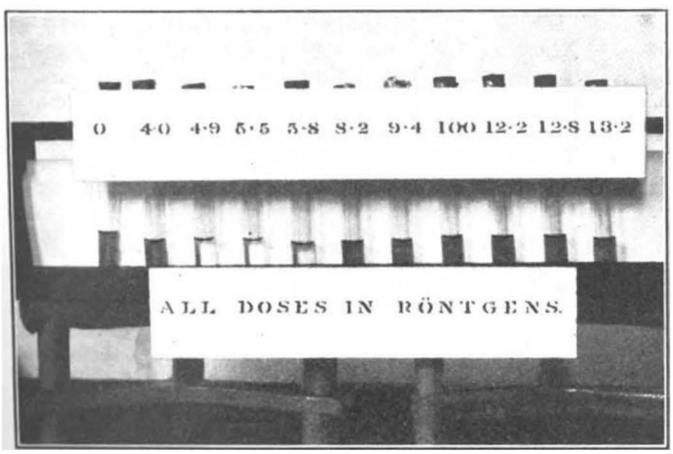
NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 578.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Effect of Increasing Doses of X-Radiation on Colloidal Gold

SOME time ago, in a communication from this Department[1], it was shown that a steadily increasing exposure to X-radiation produced alternate increases and decreases in the electrokinetic potential of certain colloid particles. The colloid used at the time (a dilution of 'Aquadag' in water) is peculiarly stable, and at no stage were there any signs of coagulation. It was thought possible that with a more sensitive colloid the decrease in potential at the minima of the curve might be sufficient to bring the colloid to its flocculation point, and at my suggestion Dr. Liebmann and Mr. Jones have been working with certain pure gold sols.

After irradiation in a quartz dish by measured doses of X-radiation, the specimens of the sol were transferred immediately to well-cleaned pyrex test tubes, and allowed to stand for a few hours. As will be seen from the attached photograph, specimens of the sol which had been exposed to doses of 4·9 and 5·5 röntgens were completely coagulated, and that exposed to a dose of 5·8 röntgens very largely so. On the other hand, specimens of the same sol, exposed to larger doses (8·2–12·8 r.) show no signs of precipitation. The last tube (13·2 r.) shows slight sedimentation, indicating the onset of a new coagulation dose.



The results are completely reproducible, for the given sol, and measurements with the ultra-microscope show that the doses producing coagulation are, in fact, those which produced the greatest decrease in the electrokinetic potential of the particles. The photograph illustrates very vividly the interesting fact that, at any rate for certain colloidal solutions, a comparatively small dose of X-radiation may produce complete precipitation, while a dose of twice the amount leaves the sol apparently unaffected. A further feature of interest is the very small quantity of radiation required to produce the effect.

It is hoped to publish further details of the measurements shortly.

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[1] NATURE, **140**, 28 (1937).

Structure of Age-Hardened Aluminium-Copper Alloys

WE have made X-ray diagrams of aluminium-copper alloys (5 per cent Cu) age-hardened at various temperatures (25°–200° C.); the samples were composed of large crystals, and the radiation was made monochromatic by reflection by a crystal. In a previous paper[1], we described a new phenomenon which appeared in these diagrams: streaks of various length issuing from the centre, which we attributed to the reflection of X-rays by planes. We have shown that these planes are parallel with the 100 planes of the crystal of solid solution and, moreover, that they are of small dimensions (100–400 A.). We assumed, therefore, that these planes were composed of groups of copper atoms, without making any hypothesis about the disposition of the atoms within those groups.

Continuing the study of these alloys (among other things we have made use of molybdenum radiation besides that of copper), two other peculiarities were noticed:

(1) From the very intense spots produced by the X-ray reflection by the 111, 100, 110 planes of the solid solution, one or two straight streaks of varying dimensions and of very weak intensity issue. As to the spots 100, one is directed towards the centre, the other is perpendicular to it. As for the spots 111, 110, on the contrary, they may be inclined to the central radius.

(2) A number of distinct spots of extremely weak intensity appear, for which the crystals of the solid solution cannot be responsible. By orientating a given crystal so that the primary beam is parallel with an edge of the cube, the diagram which appears on a plate perpendicular to the beam is shown schematically in the figure below. The streaks in the centre are due to the groups of atoms included in the planes perpendicular to the plane of the figure, and the distance OA is equal to the distance from one spot 100 of the aluminium crystal to the centre; and the spots B_1, B_2, B_3, B_4 are in the middle of the lines A_1, A_2 . . .