high atomic weight than of materials of low atomic weight. The numbers given above show this, and indicate that the "mass" range of β -rays is about 15/7.2 times or twice as great in lead as in paper.

From the results it can be shown that, in general, secondary β -rays after their expulsion can only give rise to a negligible proportion of the secondary x- or γ -rays formed when a primary beam of x- or γ -rays pass through matter.

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POSITIVE RAY ANALYSIS OF ZINC AND CALCIUM.

BY A. J. DEMPSTER.

FURTHER experiments with zinc have shown that large variations occur in the proportions of the four components observed.¹ This makes the reasoning invalid in which the atomic weights were deduced to be 63, 65, 67 and 69, in order that the mean weight might agree with the chemical atomic weight 65.4. With calcium anodes to which a little zinc had been added, it was found possible to obtain the calcium and zinc lines at the same time and compare their atomic weights. The zinc lines were thus found to have the atomic weights 64, 66, 68 and 70. This makes zinc agree with the rule observed to hold in the isotopes of the inert gases, that even atomic weight usually goes with even atomic number. The strong calcium line at 40 was compared with a potassium line at 39 and a magnesium line at 24. With calcium a weak component was observed with atomic weight 44. This is provisionally considered to be a real isotope and not due to carbon dioxide, since any calcium carbonate present should be dissociated at a lower temperature than that used.

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THE EFFECT OF DISSOLVED SUBSTANCES ON THE DEPOSITION OF COLLOIDAL PARTICLES FROM A SOLUTION BY MEANS OF AN ELECTRIC CURRENT.

BY RICHARD D. KLEEMAN.

DURING some experiments on the electric deposition of porcelain slip it was observed that the closeness of the particles of the deposit obtained was affected by a small quantity of a substance dissolved in the slip, the magnitude of the effect depending on the nature of the substance dissolved. Thus for example, the deposit obtained from a slip containing about 1/300 of its weight of sodium silicate (Na_2SiO_3) is hard though not quite dry, while that obtained without the admixture of sodium silicate is of a semi-liquid consistency like cream. Similar results were obtained with Na_3PO_4 , Na_2HPO_4 , Na_2SO_4 , H tartrate, Na tartrate, NaOH, KOH, and in fact most substances show the same effect in a more or less degree.

The effect was found to be closely associated with the increase in fluidity

¹ PHYSICAL REVIEW, (2) xix., p. 271.