Letters to the Editor

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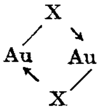
NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 590.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Constitution of Aurous Compounds: Gold Mirrors

THE volatile aurous compounds described by Dr. F. G. Mann and Dr. A. F. Wells[1] provide further examples of the fact that, in its aurous compounds, gold is always 2-covalent. Constitutionally analogous sulphur and nitrogen compounds are also known. It is significant that whenever gold is in solution in the aurous condition, the metal is always present in a complex ion. This is shown in the cases of such typical compounds as potassium aurocyanide, $KAu(CN)_2$, and hydrobromoaurous acid, $HAuBr_2$. Like the auric ion, the aurous ion appears to be incapable of existence, and some investigations[2] have shown that the probable constitutions of the aurous halides and of aurous cyanide are respectively :



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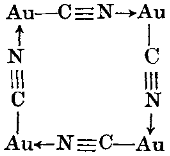
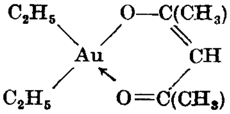


Thus, even in its simplest compounds, aurous gold appears always to be 2-covalent, while auric gold is always 4-covalent and the four valencies are coplanar with the gold atom[3].

The production of gold mirrors by the heat decomposition of gold compounds is, of course, not new. Faraday in 1856 showed that drops of "gold chloride" solution evaporated in watch glasses and heated over a spirit lamp produced films which exhibited by transmitted light the same colours as the gold-containing liquids (Chemistry Exhibit, 157, Science Museum). In 1930, brilliant mirrors or films of pure gold were produced by gently heating the volatile tervalent and 4-covalent gold compound, diethylgoldacetylacetone[4] :



Some of the first pure gold films produced at ordinary temperatures by the process recently described[5] can be seen in the gold exhibit in the South African Court of the Imperial Institute.

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[1] NATURE, **140**, 502 (Sept. 18, 1937).

[2] *J. Chem. Soc.*, 860 (1934) ; 219, 1024 (1935).

[3] Cox and Webster, *J. Chem. Soc.*, 1635 (1936). Gibson and co-workers, forthcoming publication.

[4] Gibson and Simonsen, *J. Chem. Soc.*, 2532 (1930).

[5] NATURE, **140**, 279 (Aug. 14, 1937).

Structure of Organic Molecular Compounds

THREE general conceptions are current as to the nature of the valence forces responsible for the formation of organic molecular compounds, each of which may conceivably be true as the limiting case in certain classes of compound :

(*a*) The molecular compounds are merely lattice compounds, involving no genuine chemical bonding, but depending for their formation and composition upon considerations of packing. This probably applies to such compounds[1] as $CHI_3.3S_8$.

(*b*) Combination occurs by the formation of true co-ordinate links, as in inorganic molecular compounds. This view has been developed, probably incorrectly, in connexion with the polynitrobenzene – hydrocarbon compounds[2].

(*c*) Union is effected by the forces of interaction between strongly polar groups and the highly anisotropic, polarizable aromatic systems[3]. The London forces thus involved are, in a sense, intermediate between van der Waals's attractions and true covalencies.

During the past few months, an X-ray examination has been made of the quinhydrones and related compounds, with the view of eliciting the evidence of crystal structure as to their constitution. A similar approach to the nitrobenzene – hydrocarbon compounds was made by Hertel[4], without conclusive results. The full results of the present investigation will shortly be presented elsewhere, but the following morphotropic considerations appear to lead the problem nearer to a solution.

(1) The discrete existence of quinonoid and quinoloid units in the structure, necessitated by the revised quinhydrone structure of Palacios and Foz[5], is confirmed.

(2) The identity of the a and b dimensions in ordinary quinhydrone and in α-naphthoquinone quinhydrone (see table) show that the quinone and quinol groupings lie essentially in the (001) plane, with the breadth of the molecules along c, as was advanced for quinhydrone[5].

(3) For dimensional reasons, the quinone and quinol units can alternate only along the a and c directions, but not along b. The formation of quinhydrone by a species of infinite hydrogen bond polymerization[6], which, from the orientation of the molecules, could only take place along b, is thereby excluded.

(4) In phenoquinone, $C_6H_4O_2.2C_6H_5OH$, b and c are essentially unchanged, whereas a is exactly 3/2 times the a dimension of quinhydrone. Clear evidence is thus afforded that the components alternate along a. In various p-substituted phenoquinones, a and c are also slightly modified (due to the bulk of the substituents and to the inclination of the molecules to (001)) while retaining the same essential characteristics.