

is selectively adsorbed, this will cause an increase in its concentration in the lower tube and a corresponding decrease in the upper tube. By counting the drops and measuring the volume of mercury passing each second, the area of surface can be estimated, while the concentration change indicated by the interferometer and a knowledge of the rate of flow of the gas enable the amount adsorbed per unit area to be calculated. Measurements indicate that for concentrations of 5, 10, and 15 per cent. carbon dioxide in either hydrogen or argon, approximately a complete monomolecular layer of carbon dioxide is adsorbed within one-fifth of a second after the surface is formed. At a concentration of one-half per cent. the adsorption appears to be definitely less, and at fifty per cent. definitely more, than is accounted for by a monomolecular layer.

Later it is hoped to publish a detailed account of the work, together with measurements of surface tension of both the 'big-drop' and 'drop-weight' methods of surfaces formed in similar mixtures of gases. Measurements of the weights of mercury drops falling from tubes wetted by the mercury (amalgamated platinum or copper) in general yield greater values for drops formed in air than for those formed *in vacuo*, so it seems at least possible that the 'drop-weight' method of measuring surface tension gives different values according to whether the liquid does or does not wet the tube.

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Periodicity of Molecular Numbers.

I BELIEVE the following facts will serve a purpose in disclosing a new molecular structure principle. Construct a table as follows :

A	B	C	D
—	—	0	2
4	6	8	10
12	14	16	18
20	22	24	26
28	30	etc.	etc.

Let these figures represent molecular numbers (total atomic numbers) of compounds containing no elements beyond scandium. The distribution of mole-

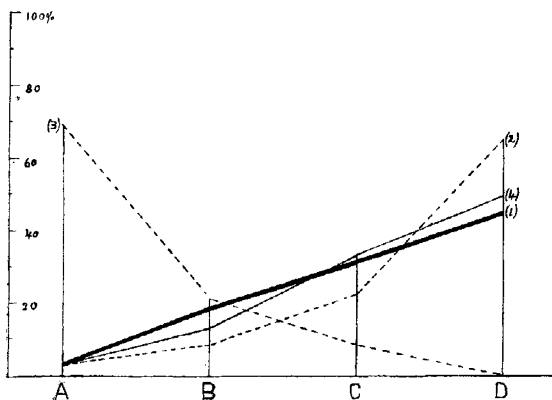


FIG. 1.

cular numbers of certain classes of substances among these four groups reveals a marked preponderance of one group and a corresponding deficiency towards another. The diagram (Fig. 1) indicates the percentage of occurrence, in each group, of the following sets

of compounds : (1) 244 gases having b.p. 100° C. or below ; (2) 57 inorganic acids ; (3) 24 most familiar bases ; (4) a random set of 60 ions where a unit was added to or subtracted from the total atomic numbers of each for every negative or positive charge respectively.

The striking contrast between the curves of acids and bases is significant, as well as the similarity between those of gases and ions. There is the following connexion between my table and isometric polyhedrons, on the grounds that atomic numbers represent fundamental units which tend to occur in pairs : a pair on each face of a cube, or of combinations thereof, produce numbers of group A, or of group B if a pair be assumed in the centre of the configuration as well ; a pair on each face of any isometric solid, excepting those just mentioned, will give a number of group C, or of group D if a pair be also assigned to the centre. It may be stated that the properties of ions and molecules are periodic functions of their molecular numbers, under certain restrictions, and it must not be overlooked that we are now considering only the first 21 elements of the periodic system, for reasons which cannot be discussed here.

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Critical Potentials of Copper by Electron Impacts.

THE following method has been used successfully in the determination of some of the critical potentials of copper by electron impact. Essentially the method is the ordinary three electrode one in which an equipotential source of electrons, a gauze, and a receiving electrode are used. The gauze in this case was made of a copper strip 0.025 mm. thick, through which holes were bored. This gauze was heated electrically and served as a source of copper vapour, the electrons being accelerated to it at the same time.

The critical potentials observed, together with the values calculated from the spectroscopic data given by L. A. Sommer (*Zeit. f. Phys.*, p. 711, Nov. 1926), are as follows :

State of Atom.	Observed volts.	Sommer's value.
Ionised	7.7	7.69
² D _{3/2} , ² D _{5/2}	1.61	1.38, 1.64
² P _{1/2} , ² P _{3/2}	3.80	3.77, 3.80
⁴ P _{3/2}	4.84	4.87
² D _{3/2}	5.65	5.75
³ P _{1/2}	6.08	6.09
³ S _{1/2} , D	6.73	6.52, 6.75
² D _{3/2} ²	8.26	8.28
² G _{5/2}	8.73	8.73
² F ₁	9.40	9.27
...	10.07	10.01
Ionised	10.91	10.90

One other critical potential observed at 2.6 volts corresponds to no spectroscopic transition and may possibly be due to an impurity.

The question might be raised whether the value of 9.4 volts might not correspond to an ionisation from the metastable D state. This would require 9.52 volts. This does not seem probable, however, as it would require two electron impacts. On account of the low vapour density available and small electron current, any effect depending on two electron impacts would be too slight to be noticeable.

The method is being applied to other metals.

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