should also be possible to calculate such free energies from specific-heat curves. We hope to be able to carry out work along these lines.

Contribution from the Chemical Laboratory of the University of California
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Attempts to Prepare a Fluocarbonate and their Bearing upon the Coördination Number of Carbon.—The maximum number of atoms that can be directly linked to a carbon atom is considered by the organic chemist to be four. However, the existence of such a compound as H_2SiF_6 containing the closely related element silicon, and where the silicon atom is probably surrounded by six atoms of fluorine, suggests the possibility that carbon also, under exceptionally favorable circumstances, might show a higher coördination number than four. When we examine the factors that determine whether or not two binary compounds possessing a common negative constituent will unite to form a double compound certain generalizations are at once apparent. We note first that complex halides are more stable, the more positive the ionized metal; hence, cesium which "lets go of its electrons most readily," should be the most favorable positive element to use; second, we note that fluorine gives more stable complexes than chlorine, etc. For example, we have fluosilicates but no chlorosilicates. We may, therefore, conclude that the compound most likely to show a carbon atom surrounded by six negative atoms would be cesium fluocarbonate.

The preparation of this compound was attempted by allowing carbon tetrafluoride to act upon cesium fluoride at various temperatures. Carbon tetrafluoride was prepared according to one of the methods given by Moissan,[1] that is, the action of carbon tetrachloride upon silver fluoride, the latter prepared by the action of fluorine upon silver oxide or silver chloride. Silver fluoride being deliquescent, the preparation of the anhydrous salt from the wet salt is not satisfactory.

Attempts to make the carbon tetrafluoride react with the cesium fluoride were made as follows. The former was condensed to a liquid on a weighed sample of the latter in a platinum boat cooled to —80°. The boat and contents were brought to room temperature and weighed; there was no increase in weight. Carbon tetrafluoride was passed into a suspension of cesium fluoride in alcohol at —80°. Upon evaporation of the alcohol at room temperature there was again no evidence of increase in weight. Upon introduction of an excess of solid cesium fluoride into gaseous carbon

[1] Moissan, *Compt. rend.*, **110**, 951 (1890).

tetrafluoride at —10° there was no diminution in pressure. The same negative result was found upon using barium fluoride.

Other attempts to prepare a fluocarbonate by the action of fluorine upon cesium carbonate and upon potassium bicarbonate resulted in the formation only of cesium fluoride and potassium acid fluoride.

It was thought that in spite of the theoretical considerations previously announced it might be worth while to determine whether hydrogen fluoride and carbon tetrafluoride would show any tendency to react. Mixtures of the two liquids were made in enclosed copper apparatus. The liquids were shaken together and then frozen. As the mixture was allowed to warm very slowly a time-temperature curve was taken. In every experiment the curves showed breaks only at the freezing points of the two liquids, indicating not only that there is no reaction between them, but that they are not appreciably soluble in each other.

The negative results of all these attempts to prepare fluocarbonic acid or a fluocarbonate render the possibility very remote of obtaining a carbon compound in which the carbon would show a greater coördination number than four.

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THE DOUBLE BOND

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In his paper, "The Atom and the Molecule," Lewis[1] pointed out that the double bond represents, because of the mutual repulsion of the nuclei, a point of weakness in the molecule; and he showed how dissociation might be supposed to occur at non-polar linkages producing parts more or less polar and reactive.

In the present paper it is proposed to show how this idea together with other specific assumptions of the octet theory may be used to account for the reactions of the double bond.

Discussion will be limited for the sake of brevity to double bonds between any pairs of the following atoms: carbon, nitrogen and oxygen. This can be done without much loss of generality because most important addition reactions occur at such double bonds.

It has been found convenient to represent the more or less cubical structures assumed in the Lewis theory by means of a plane projection. Since

[1] Lewis, THIS JOURNAL, 38, 762 (1916).