INTRODUCTION.

The investigation, an account of which is here given, bears on the general questions as to the structure and the conditions of formation of the double halides. Compounds of this class, though known for many years, did not, until recently, attract much attention. Being regarded as molecular and not atomic compounds, the investigation of their structure seemed to present unusual difficulties. The apparent analogies between the double halides and the oxygen salts were frequently discussed,' but it was not until 1867 that the conception of the union of the molecules through the chlorine atoms was first put forward by Naquet." This theory has since been expressed by several other chemists,^{*} and was recently fully discussed by Professor Remsen, who laid special stress on the view that pairs of halogen atoms exert a linking function in these compounds similar to that exerted by single oxygen atoms in the oxygen salts, and formulated the following law in regard to the composition of the double halides :

"When a halide of any element combines with a halide of an alkali metal to form a double salt, the number of molecules of the alkali salt which are added to one molecule of the other halide is never greater and is generally less than the number of halogen atoms contained in the latter."

This law was based on the formulas of several hundred double halides; nevertheless, a few exceptions to it are found recorded in chemical literature. Some of these records have already been shown to be incorrect.

The present paper treats in the first part of some of the double halides containing manganese, and in the second chiefly of some of the supposed exceptions to the law stated above.

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¹Von Bonsdorff, Ann. chim. phys. [2] 34, z42; Boullay, Ibid. [3] 34, 337; Bolley, Liebig's Ann. 39, 100; Liebig, Ann. chim. phys. [2] 35, 68; Berselius, Bers. Jahrsb. 8, 138.

⁸ Principes de Chimie fondée sur les Theories Modernes, Paris, 1867, p. 62. ⁸ See especially Blomstrand, Die Chemle der Jetztzeit etc., Heidelberg, 1869; Armstrong,

British Assoc. Reports, 1885, 959; Heyes, Phil. Mag. 25, esz, 297. 4 Am. Chem. Jour. 11, 291.