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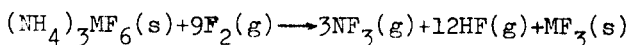
NITROGEN TRIFLUORIDE BY DIRECT FLUORINATION OF AMMONIUM METAL FLUORIDES

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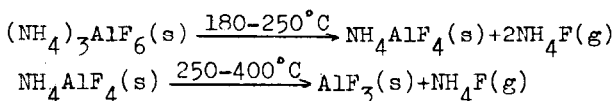
The synthesis of nitrogen trifluoride by direct fluorination of ammonium metal fluoride, $(\text{NH}_4)_3\text{MF}_6$ has been examined.

The metal fluoride ammonium complexes are readily reacted with fluorine gas to form nitrogen trifluoride together with hydrogen fluoride and metal fluoride, by the following equation.



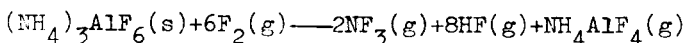
This gas-solid reaction takes place at the temperatures below the thermal decomposition temperatures of the metal fluoride ammonium complexes.

For example, thermal decomposition of $(\text{NH}_4)_3\text{AlF}_6$ proceeds in two stages.



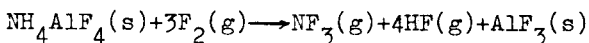
Accordingly, the reaction of this complex with fluorine is considered to proceed also in two stages.

The first stage of the reaction is to the extent of formation of NH_4AlF_4 .



The reaction at this stage starts at temperature below 100°C and the reaction temperature rises as the reaction proceeds to about 150°C .

At the second stage, ammonium aluminum fluoride reacts with fluorine to turn into aluminum fluoride.



The reaction temperature rises as the reaction proceeds to about 250°C .

The yield of nitrogen trifluoride is so high that this novel reaction can be utilized in industrial field.