

D1
INORGANIC CHEMISTRY

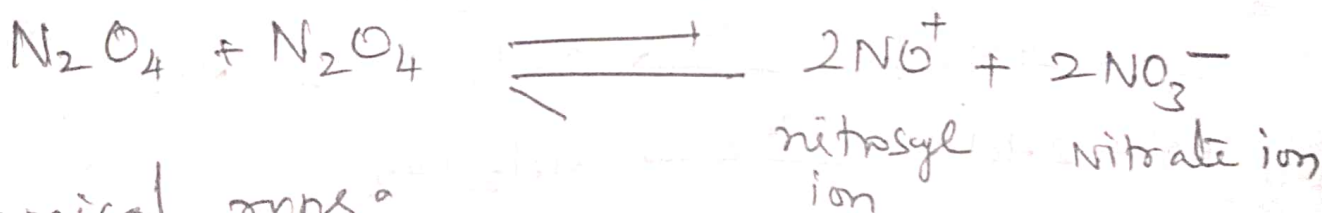
Selected Topics in
Inorganic Chemistry
MDM

UNIT - I ACID & BASES

Liquid Nitrogen Tetroxide: N_2O_4

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- * Powerful oxidising agent.
- * It can oxidise reducing agent substances explosively particularly of organic nature.
- * It has low dielectric constant
- * Poor solvent for ionic substances, but good " " organic compounds.
- * The auto ionisation of



Chemical rxns:

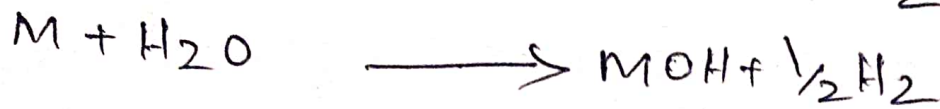
① Acid-Base rxns:

- * formation NO^+ from auto-ionisation would behave as acids in liq. N_2O_4
- * formation of NO_3^- from auto-ionisation would behave as bases in N_2O_4



② Reaction with metal:

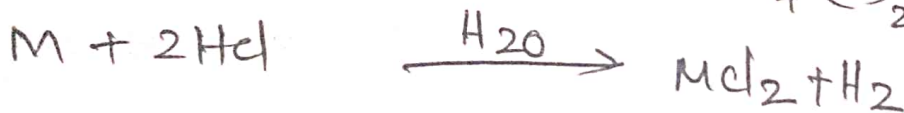
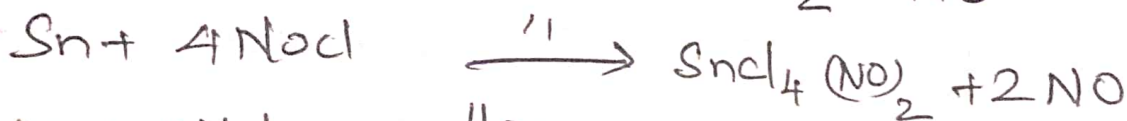
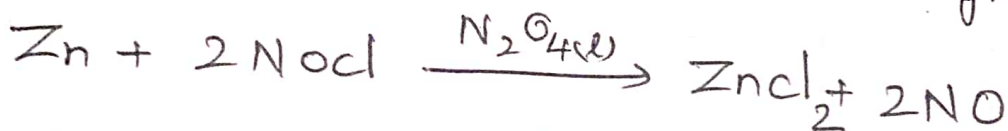
(2) Reaction with metal:



This rxn is manner as water.

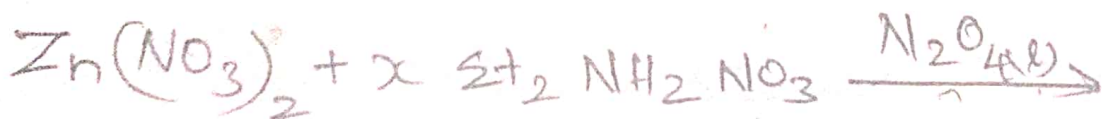
* Addition of HCl to H_2O increases the reactivity of H_2O towards metals.

* addition of NOCl to N_2O_4 also increases its reactivity toward metals. eg. Zn, Fe, Sn



(3) Complex formation:

* $Zn(NO_3)_2$ dissolves readily in a solution of diethyl ammon. nitrate $\text{Et}_2\text{NH}_2\text{NO}_3$ in liq. N_2O_4 to yield nitro zinc complex.



Solid



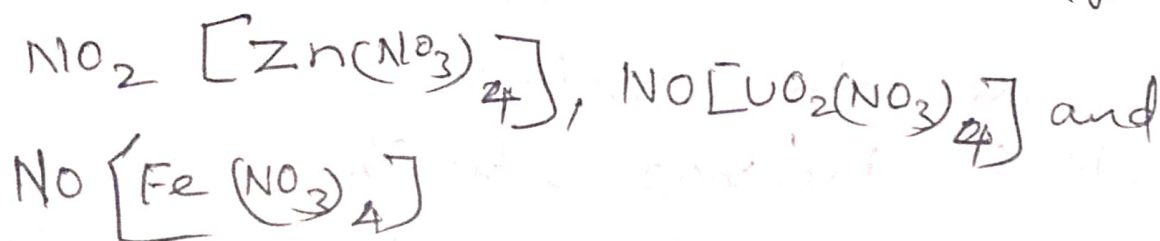
diethyl ammonium nitro zincate

* above rxns indicates amphoteric rxns.

A) Solvate formation rxns:

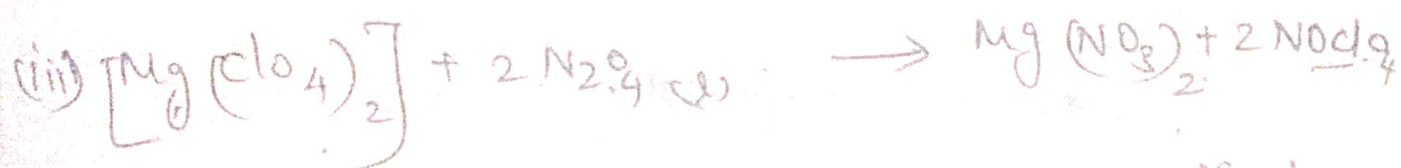
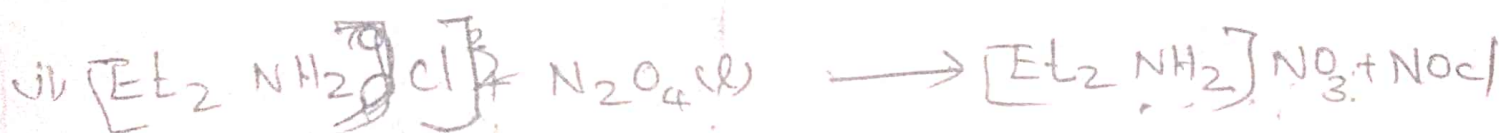
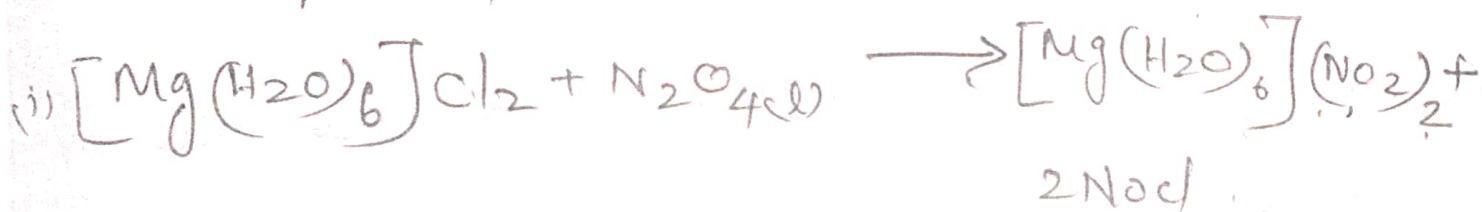
* nitrate of some metals such as Zn, U and Fe react with N_2O_4 to form the solvates. e.g. $Zn(NO_3)_2 \cdot 2N_2O_4$, $UO_2(NO_3)_2 \cdot N_2O_4$ and $Fe(NO_3)_3 \cdot N_2O_4$ respectively.

* These are complex salts. (eg)

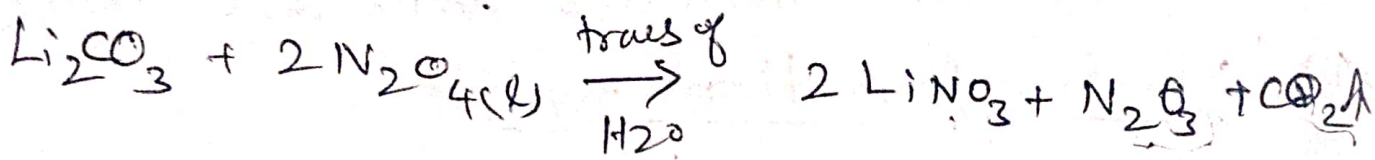


(5) Solvolytic rxns:

* no. of solvolytic rxns have been studied in liq. N_2O_4



* $LiCO_3$ gets solvated in presence of traces of H_2O .



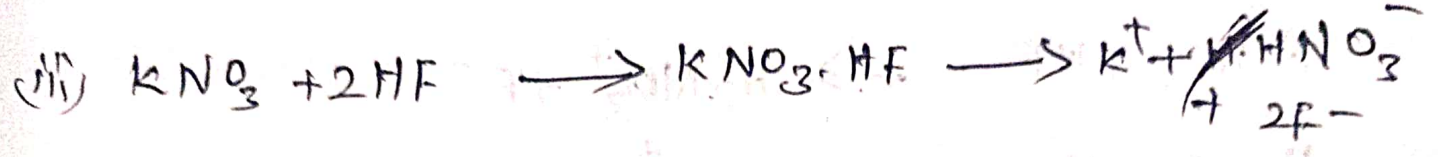
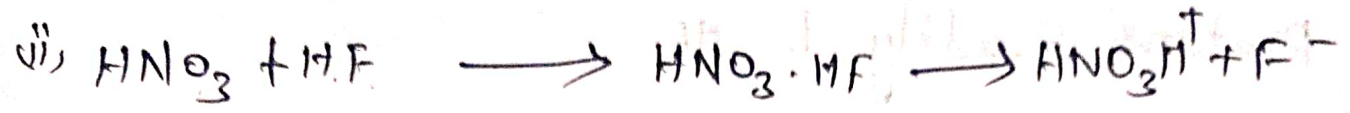
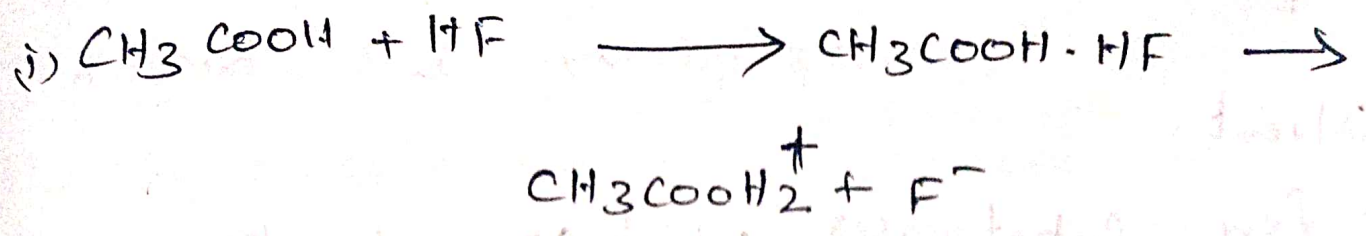
Liquid HF : (243)

- * liq. HF has a wide but convenient liquid range (-83°C to 19.4°C)
- * soluble few substances without chemical rxns and it has poisonous character.
- * High dielectric constant
- * excellent ionising solvents.
- * It dissolves many organic & inorganic compds to give highly conducting solutions.
- ↳ Inorganic compds are more soluble than organic compds.
- * HF dissociates into ions, viz H^+ & F^-



Such solutions behaves as acidic solutions.

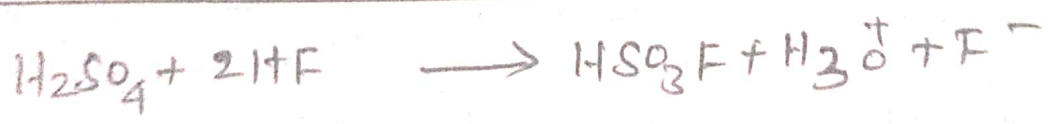
followed by dissociation to give F⁻ ion,



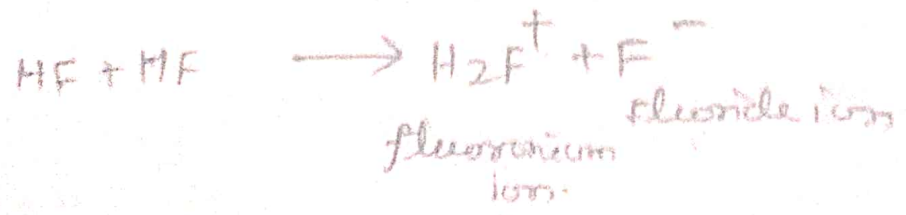
* The anion of the solute may be replaced by F⁻ ion.



* chemical reactions involving more than simple replacement may take place



* Auto ionisation

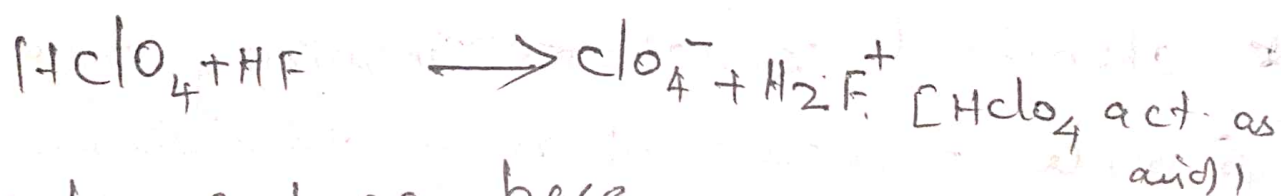
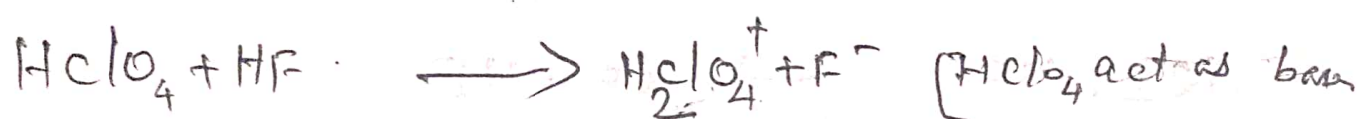


* H_2F^+ ions will behave as an acid
 F^- " " " " base in solvent.

* Few substances which can donate protons readily to HF.



* $HClO_4$ strongest acid in aq. sol. acts as an amphoteric in HF.

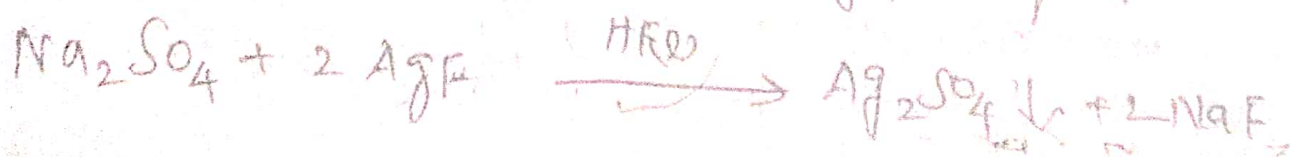


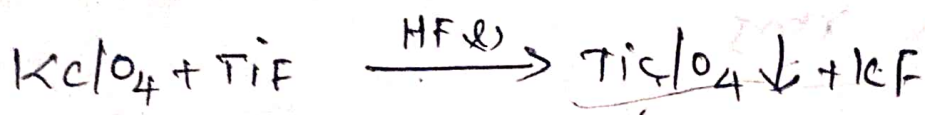
* ~~$HClO_4$ act as base~~

* Compounds acting as acids in liq. HF



* precipitation rxns occurring in liq. HF





* The precipitation rxn are



* HF also form a no. of addition compounds with metallic fluoride, eg $\text{KCl} \cdot \text{HF}$, $\text{KCl} \cdot 2\text{HF}$, $\text{KCl} \cdot 3\text{HF}$, $\text{NH}_4\text{F} \cdot \text{HF}$ etc

Acetic Liquid bromine Trifluoride

* liq. BrF_3 indicates ioniser.



* SbF_5 act as an acid in liq. BrF_3



SbF_5 act as an acid in BrF_3 .

* KF act as a base in HF



Neutralisation rxns

Neutralization rxns occurs on mixing the solutions of SbF_5 + KF in liq. $BBrF_3$



Neutralisation rxns help us to synthesise many compounds.

