

Chemistry in aqueous and non-aqueous solutions

Categories of non-aqueous solvents:

Protic solvents

They contain contain hydrogen atom and connected directly to an electronegative

They are capable of hydrogen bonding atom (such as O-H or N-H bonds)

Example:

HF, H₂SO₄ , MeOH, HOSO₂F

Aprotic Solvents

They contain no hydrogen atoms connected directly to an electronegative atom

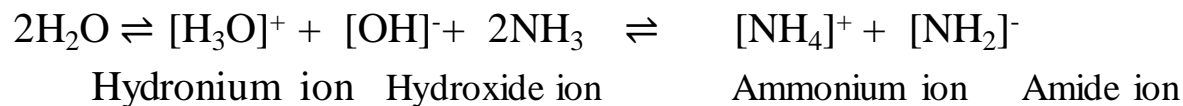
They are not capable of hydrogen bonding.

Example:

N₂O₄ , BrF₃

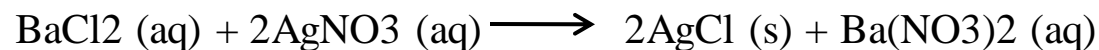
Chemistry in aqueous and non-aqueous solutions

- ▶ Acids and bases: a solvent oriented definition Self-ionizing solvent: an acid is a substance that produces the cation characteristic of the solvent,
- ▶ A base is a substance that produces the anion characteristic of the solvent.

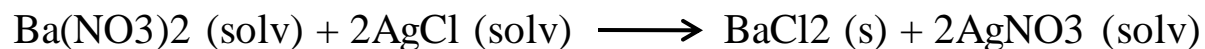


Chemistry in aqueous and non-aqueous solutions

Precipitation reactions in liquid ammonia In aqueous solution:



In NH_3 :

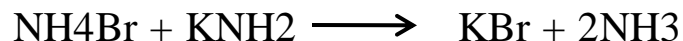
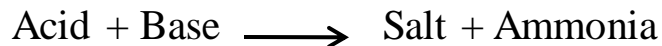


Solubility of AgCl is 0.29 g/100 g H_2O liquid NH_3 compared with 1.91×10^{-4} g per 100 g H_2O

In NH_3 :



Neutralization reactions in liquid ammonia



Chemistry in aqueous and non-aqueous solutions

Solutions of s-block metals in liquid NH₃

- All Group-I alkali metals and group-2 metals Ca, Sr, and Ba dissolve in liquid NH₃. Dilute solutions of the metals are bright blue in color.
- Color is arising in the IR region due to a broad and intense absorption.
- $M \longrightarrow M^+(\text{solv}) + e^-(\text{solv})$
- Dissolve in liquid NH₃.
- Dilute solutions are paramagnetic with unpaired electron.
- The magnetic response corresponds to that of one free electron per metal atom.