From left to right on the periodic table, **acid-base character of oxides and hydroxides** go from basic to acidic.

- Increasing charge on an anion increases the production of basic solutions.
- As electronegativity increase, production of ionic cations increases because elements are more able to adopt a cation.
- As ionization energy increases, the acidic nature increases.

**Metallic Oxides:**

- Ionic Bonding: no distribution of electron wave function
- Ionic oxides are usually basic (element act as a base when reacting with H2O)

\[ \text{Na}_2\text{O(s)} + \text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(aq)} \rightarrow 2\text{Na}^+(aq) + 2\text{OH}^-(aq) \]

**B. Oxide B. Hydroxide**

**Semimetal Oxides:**

- Semimetal are amphoteric (elements acts as an acid and/or base when reacting depending on pH of solution)

\[ \text{Al}_2\text{O}_3 \rightarrow \text{Al(OH)3} \rightarrow 3\text{H}^+ \rightarrow [\text{Al(H}_2\text{O)}6]^{3+} \text{(aq)} \]

\[ \text{--}(\text{OH})\rightarrow [\text{Al(OH)}4]^-\text{(aq)} \]

**Non-Metal Oxides**

- Covalent Bonding: almost complete distribution of electron wave function

- Covalent oxides are usually acidic (elements act as an acid when reacts with H2O)

\[ \text{SO}_3 + \text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{SO}_4\text{(aq)} \rightarrow \text{H}^+ + \text{HSO}_4^- \]

**A. Oxide A Hydroxide**
Ionic Hydrides

- Ionic Bonding: no distribution of electron wave function
- Bronsted Basic because they will react with proton
- Lewis Basic because they can be ligands

CaH₂ + 2H₂O → 2H₂ + Ca(OH)₂

H⁻ H⁺ H₂

-In this case, CaH₂ is basic because it reacts with water (an acid in this case) to form many hydrides by reducing a proton.

Covalent Hydrides

- Covalent Bonding: almost complete distribution of electron wave function

HF + H₂O → F⁻ + H₃O⁺ ....can also be written as HF(aq) <--→ H⁺(aq) + F⁻(aq)

H⁺ H⁺ H⁺

- HF is a weak acid that is bronsted acid because it will loose a proton. Therefore, HF is the weak acid, where the water acts as a silent water, and F⁻ is the weak conjugate base.
Contributors

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