

Acids and Bases

- 121 (a) Aluminium ion

Explanation:

When AlCl_3 dissolves in water:

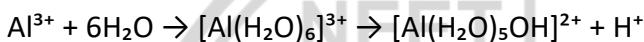
Al^{3+} ion has a high positive charge.

It attracts water molecules and polarizes them, causing release of H^+ ions.

This makes the solution acidic.

Chloride ion (Cl^-) does not hydrolyze — it is the conjugate base of a strong acid (HCl), so it does not affect pH.

Hydrolysis (Word-Friendly Equation):



$\rightarrow \text{H}^+$ released \rightarrow acidic solution

122. (d) Because it is a weak electrolyte.

123. (b) Adsorption indicator

Explanation:

In precipitation titrations, certain dyes (like eosin) get adsorbed on the precipitate near the endpoint \rightarrow colour change occurs \rightarrow called adsorption indicators

124. (a) Starch

Explanation:

Starch forms a deep blue complex with iodine \rightarrow used to detect the endpoint in iodometric titrations.

125. (b) $\text{H}_2\text{C}_2\text{O}_4$ and KMnO_4

Explanation:

This titration is redox titration, not acid-base.



$KMnO_4$ is self-indicator \rightarrow purple colour disappears at endpoint.

Hence phenolphthalein is not needed and not suitable.

126. (c) $AlCl_3$ and SO_2 both are example of Lewis theory.

127. (c) $Na_2CO_3 + 2H_2O \rightleftharpoons 2NaOH + H_2CO_3$. It is a strong base and weak acid so it is a basic.

128. (d) Conjugate acid of the base

Explanation (Word-friendly):

When a base accepts a proton (H^+), it becomes its conjugate acid.

This is based on the Brønsted–Lowry acid-base theory, which states:

Acid \rightarrow proton donor

Base \rightarrow proton acceptor

After accepting a proton, base \rightarrow conjugate acid

After donating a proton, acid \rightarrow conjugate base

129. (c) $H_2O + NH_3 \rightleftharpoons NH_4^+ + OH^-$.

In this reaction H_2O acts as acid because it donates a proton.

130. (b) $H_2SO_4 + H_2O \rightleftharpoons H_3O^+ + HSO_4^-$

Conjugate acid and base pair

131. (b) $Al_2(SO_4)_3 \rightleftharpoons 2Al^{3+} + 3SO_4^{2-}$

$Al(OH)_3 + H_2SO_4$
Weakbase Strongacid

132. (c) $NaOH + HCl \xrightleftharpoons[\text{Reaction}]{\text{Neutralization}} NaCl + H_2O$



133. (a) Conjugate acid is obtained from the base by gain of H^+ .

134. (c) KCl is a ionic compound.

135. (a) $H_3BO_3 + H_2O \rightleftharpoons [B(OH)_4]^- + H^+$

H_3BO_3 is a weak monobasic acid if does not act as a H^+ donor but behaves as a Lewis acid.

136. (c) Because it is not accept the proton.

137. (c) NH_4Cl is a salt of weak base (NH_4OH) and strong acid (HCl).

138. (b) Because it accept electron pair from the PH_3

139. (b) $NH_4^+ \rightleftharpoons NH_3 + H^+$

140. (d) NF_3

Explanation (Word-Friendly):

Basicity of nitrogen halides depends on the availability of the lone pair on nitrogen.

Fluorine is highly electronegative, so in NF_3 , it pulls electron density away from nitrogen.

This makes the lone pair on nitrogen less available for donation, reducing basicity.

Therefore, NF_3 is the least basic nitrogen halide.

Order of basicity:

$NBr_3 > NCl_3 > NI_3 > NF_3$ (least basic)

