

Prelab Questions

1. One in which the color is not changing.
2. a) When KB_r is added the concentration of $\text{Cu}(\text{H}_2\text{O})_6^{+2}$ reduces whereas the concentration of $\text{CuB}_\text{r4}^{-2}$ increases.
b) When KB_r is added, the concentration of the B_r^- increases in the reactant side therefore the reaction shifts to the right (forward reaction is favored). More $\text{CuB}_\text{r4}^{-2}$ is formed hence the solution turns green.
c) The tube feels cold.
3. Sodium carbonate solution $\text{Na}_2\text{CO}_{3(\text{aq})}$
4. Adding an excess of CO (carbon monoxide)

Experiment

I. Cobalt system



Added H_2O

The addition of H_2O caused the solution to turn from blue to red. Addition of H_2O favored the forward reaction, as a result more $\text{Co}(\text{H}_2\text{O})_6^{2+}$ were formed.

Added KCl

A blue solution was formed. Addition of KCl increased the concentration of Cl^- favoring the reverse reaction. Therefore, more CoCl_4^{-2} was formed.

Added AgNO₃

The blue solution turned red. Silver ions react with chloride ions to form an insoluble AgCl. The reverse reaction is favored and the AgCl precipitate dissolves.

Heating

A blue solution is observed. The reaction is exothermic. Heating shifts the equilibrium to the left favoring backward reaction.

Cooling

A blue solution turns red. On cooling forward reaction is favored. More $\text{Co}(\text{H}_2\text{O}_6)^{+2}$ is formed.

II. Ammonium system



Added NH₄Cl

Heat

The solution turns from purple to colorless. When NH₄Cl is added, NH₄⁺ on the product side increases. Forward reaction is favored and more ammonia is formed.

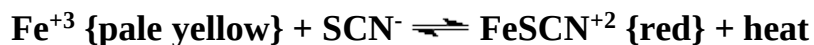
Added HCl

The solution turns from purple to colorless (solution is decolorized). Addition of HCl increases H⁺ which reacts with OH⁻ to form water. Forward reaction is favored.

NaOH added

The intensity of the purple color increases. When NaOH is added, OH⁻ concentration is increased hence the purple color.

III. Iron thiocyanate system



Added KSCN

A brown solution turns red. Addition of KSCN increases SCN⁻ concentration. Forward reaction is favored forming more FeSCN⁺²

Fe(NO₃)₃ added

A brown solution turns red. Fe⁺² concentration increases hence forward reaction is favored.

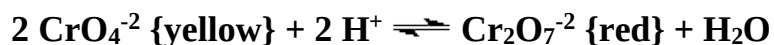
Heating

A brown solution turns pale yellow. The reaction is exothermic. Backward process is favored. More Fe⁺² are formed.

Added Na₂PO₄

A brown solution turns pale yellow. When Na₂PO₄ added, HPO₄²⁻ forms a complex with Fe⁺³ equilibrium shifts to the left.

IV. Chromate system



Added HCl

A red solution is formed when HCl is added, the concentration of H^+ ions increases.

Forward reaction is favored.(equilibrium shifts to the left). Concentration of CrO_4^{2-} reduces while concentration of CrO_7^{2-} increases.

Added NaOH

A yellow solution is observed. Addition of NaOH increases OH^- which displaces the OH^- in water forming H^+ . Reverse reaction is favored. More CrO_4^{2-} is formed.

V. Nitrogen dioxide system



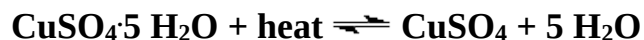
Heating

More red-brown gas is formed. The reaction is exothermic hence heating favors the backward reaction. More $\text{NO}_{2(g)}$ is formed.

Cooling

The red- brown color diminishes. Less gas is produced. Cooling favors forward reaction. More N_2O_4 is formed.

VI. Copper sulfate system



Heating

A blue solid turns white. When copper sulfate is heated it loses its water of crystallization and turns from blue to white. The forward reaction is favored.

Added water

The white solid turns to blue. Addition of water favors the reverse reaction. Equilibrium shifts to the left.

Postlab Questions

1. When the ammonium system is heated, the solution is decolorized (the purple solution turns colorless. The reaction is endothermic hence the forward process is favored.
2. $\text{NH}_4\text{OH}_{(\text{aq})}$ (ammonium hydroxide solution)
3. This implies that excess gastrointestinal x-rays are harmful to human. Increase in BaSO_4 amounts favors forward reaction. More Ba^{2+} are formed which are poisonous to human. $\text{BaSO}_4 \rightleftharpoons \text{Ba}^{+2} + \text{SO}_4^{-2}$
4.
 1. Removal of CO shifts the equilibrium to the left hence more HbO_2 is formed.
 2. Addition of O_2 favors the reverse process. More HbO_2 is formed.

