Answer all the questions below and then check your answers.

1. What do all acids release when they dissolve in water?

2. Acids are often shown as HA. What is the difference between the two equations shown below:

   equation1 - $HA \longrightarrow H^+_{(aq)} + A^-_{(aq)}$

   equation2 - $HA \rightleftharpoons H^+_{(aq)} + A^-_{(aq)}$

3. What does the pH of a solution actually measure?

a. What is the difference in hydrogen ion concentration between two acid solutions of pH 2 and pH 4?

b. What is the difference between a strong acid and a weak acid?

c. What is the difference between a concentrated acid and a dilute acid?

4. Name 2 strong acids and two weak acids.

a. Magnesium is a fairly reactive metal. Describe how the reaction of 1m hydrochloric acid and 1M ethanoic acid would differ with magnesium.

5. How could a concentrated solution of a weak acid and a dilute solution of a strong acid react in a similar way with a strip of magnesium ribbon?

Answers

1. What do all acids release when they dissolve in water? Acids are solutions with an excess of hydrogen ions, $H^+_{(aq)}$.

2. Acids are often shown as HA. What is the difference between the two equations shown below:

equation1 - $HA \longrightarrow H^+_{(aq)} + A^-_{(aq)}$

equation2 - $HA \rightleftharpoons H^+_{(aq)} + A^-_{(aq)}$

equation 1 represents a strong acid in water, the reaction goes to completion, the acid, HA is fully dissociated into ions.

Equation 2 represents a weak acid being added to water, weak acids are less than 5% dissociated in water, most are very much less dissociated than this. Weak acids form equilibrium mixtures with the position of equilibrium very much to the left hand-side, the reactants.

3. What does the pH of a solution actually measure?

It measures the concentration of hydrogen ions in solution.

a. What is the difference in hydrogen ion concentration between two acid solutions of pH 2 and pH 4? 1 pH difference represents a x10 difference in hydrogen ion concentration, so a difference of 2 pH values means x100 difference in hydrogen ion concentration.

b. What is the difference between a strong acid and a weak acid?

Strong acids are completely dissociated in water; weak acids are only partly dissociated in water.

c. What is the difference between a concentrated acid and a dilute acid?

Dilute acids have more water in them than concentrated acids.

4. Name 2 strong acids and two weak acids.

Strong acids are hydrochloric, sulfuric, nitric acid

Weak acids- methanoic, ethanoic, propanoic, carbonic

a. Magnesium is a fairly reactive metal. Describe how the reaction of 1m hydrochloric acid and 1M ethanoic acid would differ with magnesium.

Weak acids have less hydrogen ions present so reactions will be very much slower than that of a strong acid of similar concentration.

5. How could a concentrated solution of a weak acid and a dilute solution of a strong acid react in a similar way with a strip of magnesium ribbon?

Dilute solution of strong acid is mostly water, so concentration of hydrogen ions could be low. Concentrated solution of a weak acid could contain a fairly large number of hydrogen ions. Perhaps the same number in a dilute solution of a strong acid.