Catalysis of the Zinc-Acid Reaction

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The pH scale is composed of two extremes that describes a chemical property about the substance being tested, these extremes are called acids and bases. Mixing acids and bases together will induce a neutralisation reaction which can cancel out their extreme effects. A substance which is neither acidic nor basic is called a neutral substance. The pH scale ranges from 0 to 14, with 0 being as acidic as possible and 14 being as basic as possible. Neutral has a corresponding pH of 7 and therefore anything below 7 is acidic and anything above 7 is basic. The pH scale is illistrated below.

Concentration of hydrogen ions compared to distilled water		Examples of solutions at this pH
10,000,000	pH = 0	battery acid, strong hydrofluoric acid
1,000,000	pH = 1	hydrochloric acid secreted by stomach lining
100,000	pH = 2	lemon juice, gastric acid, vinegar
10,000	pH = 3	grapefruit, orange juice, soda
1,000	pH = 4	tomato juice, acid rain
100	pH = 5	soft drinking water, black coffee
10	pH = 6	urine, saliva
1	pH = 7	"pure" water
1/10	pH = 8	sea water
1/100	pH = 9	baking soda
1/1,000	pH = 10	Great Salt Lake, milk of magnesia
1/10,000	pH = 11	ammonia solution
1/100,000	pH = 12	soapy water
1/1,000,000	pH = 13	bleaches, oven cleaner
1/10,000,000	pH = 14	liquid drain cleaner

Figure 2.1: The pH scale

The pH scale is a man made scale which is used to measure the concentration of hydrogen ions, each concentration is given a corresponding place on the scale (pH). pH is mathematically defined as the negative logarithm of the hydrogen ion concentration. As a result of this we can determine that the pH scale is logarithmic, therefore each value above/below the neutral value (7) is ten times more basic/acidic respectively. For example pH 6 is ten times as acidic as pH 7 and pH 5 is one hundred times as acidic than pH 7.

- pH = - log [H$\hat{+}$]

There are many indicators used to find out the pH of substances.

2.1.3 Acids

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2.2 Inventory

2.2.1 Equipment List

- 250 cm3 conical flask.
- Bung fitted to a glass tube.
- Burette.

2.2.2 Chemical List

- Distilled Water.
- 0.20 moldm-3 Copper Sulfate (aq).
- 1.0 moldm-3 Sulfuric Acid (aq).
- Granulated Zinc (s).

- Mixture of Different Catalysts.

2.3 Methods

Setting Up

1. Fill the Burette with distilled water.
2. Fit the bung (fitted with glass tube) into the conical flask.
3. Fit the inverted Burette to the end of the glass tube.

Carrying out the Experiment

1. Remove the bung from the conical flask and pour 30 cm3 of distilled water and 10 cm3 of sulfuric acid into the conical flask.
2. Weigh out 1.0 g of granulated zinc.
3. Add the measured 1.0 g of granulated zinc to the conical flask.
4. Place the bung back in the conical flask.
5. Record the volume of hydrogen produced in cm3 every 30 seconds for 5 minutes from the burette markings to 1 decimal place.
6. Repeat the experiment but use 30cm3 of copper sulfate instead of distilled water.

Interpreting the Data

1. Plot a graph of the volume of hydrogen against time.
2. From the graph draw a tangent to the line at the initial point.
3. Calculate the gradient of the tangent by using the equation:
4. The gradient is equal to the rate of reaction.

2.3.1 Justification of Chosen Method

2.4 Risk Assessment

Chapter 3

References

3.1 Sources

- Source 1 -

3.2 Figures

- Figure 1 - http://www.heartupdate.com/prevention/ph-body-influence-daily-life_94/ - Accessed 13:01, 09/02/2015.