Catalysis of the Zinc-Acid Reaction

Ben Keppie

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Chapter 1

Abstract

Chapter 2

Planning

- 2.1 Chemical Ideas
- 2.1.1 Rate of Reactions

2.1.2 pH

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.

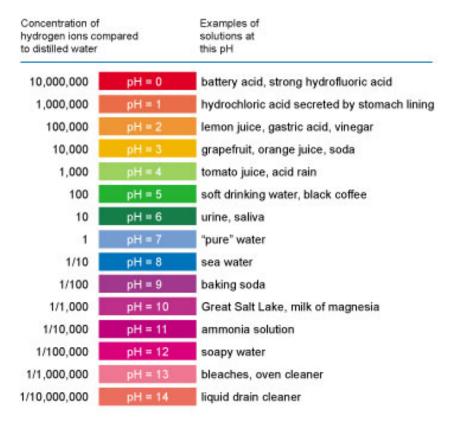


Figure 2.1: The pH scale

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.

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$$pH = -\log [H + 1]$$

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

- 2.1.3 Acids
- 2.1.4 Catalysts
- 2.1.5 Factors that affect Rate of Reaction
- 2.1.6 Enthalpy Level Diagrams
- 2.1.7 Methods of Finding Rates

Justification of Chosen Method

- 2.1.8 How the Rate of Reaction is Determined Experimentally
- 2.1.9 Rate Equations
- 2.1.10 Orders of Reactions
- 2.1.11 Transition Metal Catalysts
- 2.1.12 D-Orbitals
- 2.1.13 Complexes and their Properties
- 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 $30 \mathrm{cm} 3$ 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

 \bullet Source 1 -

3.2 Figures

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