

6 <b>C</b> Carbon	7 <b>N</b> Nitrogen	1 <b>H</b> Hydrogen	16 <b>S</b> Sulfur
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**Chemistry Department**

# **S3 Chemistry**

**Chemical Changes and Structure**

**(e) Acids and Bases**

**HOMEWORK**

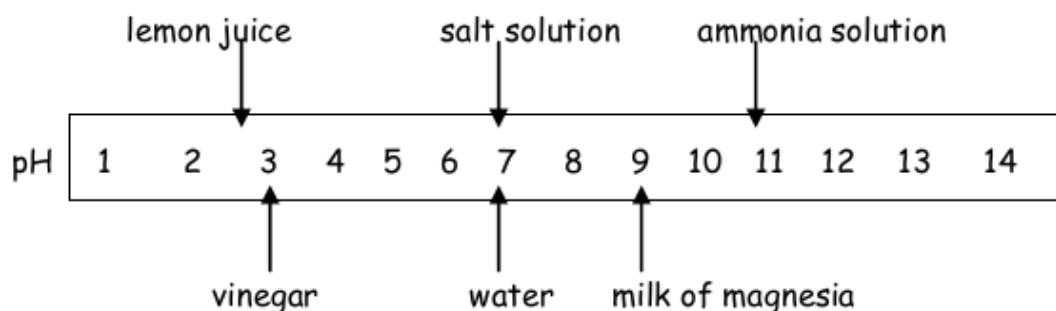


## Homework 21

## pH scale

/10

1. The chart shows the pH of some common substances:



A Ammonia solution	B Lemon juice	C Milk of magnesia
D Salt solution	E Vinegar	F Water

- a) Identify the two substances which are acids. (2)
- b) Identify the two substances which show a **decrease** in pH when they are diluted with water. (2)
2. Name three different methods of measuring the pH of a substance. (3)
3. What are you measuring when you take the pH of a substance? (1)
4. Copy and complete the following sentence:  
In \_\_\_\_\_ solutions the concentration of hydrogen ions is greater than the concentration of hydroxide ions. (1)
5. Class 4C made some statements about the effect of adding water to an **alkaline** solution.

A	The pH of the solution will rise
B	The solution will become more concentrated
C	The pH of the solution will fall towards 7
D	Adding water will have no effect on the solution

- Identify the correct statement. (1)

1. What **concentration** of solution is obtained by dissolving:  
a) 5 moles of hydrogen chloride in 2 litres of solution  
b) 0.8 moles of copper sulfate in 200 cm<sup>3</sup> of solution  
(2)
  
2. What **volume** of solution is required to make:  
a) 0.4 mol ℓ<sup>-1</sup> solution containing 1 mole of sodium hydroxide  
b) 0.1 mol ℓ<sup>-1</sup> solution containing 0.05 moles of magnesium chloride  
(2)
  
3. How **many moles** are dissolved in:  
a) 500 ml of 0.5 mol ℓ<sup>-1</sup> sodium carbonate solution  
b) 3000 cm<sup>3</sup> of 2 mol ℓ<sup>-1</sup> barium chloride solution  
(2)
  
4. What concentration of solution is made by dissolving 16.4 g of calcium nitrate in 250 ml of solution?  
(3)
  
5. What is the concentration of 100 cm<sup>3</sup> of ammonium hydroxide solution containing 0.7 g of dissolved solute?  
(3)
  
6. What volume of 4 mole ℓ<sup>-1</sup> sulfuric acid solution (H<sub>2</sub>SO<sub>4</sub>) contains 9.8 g of solute?  
(3)
  
7. What volume of solution is required to make a 0.02 mol ℓ<sup>-1</sup> solution from 3.9 g of lithium fluoride?  
(3)

1. The following oxides were added to water. Arrange them into a table with **three** suitable headings giving the effect on the pH of the water.

*sodium oxide, aluminium oxide, carbon dioxide, magnesium oxide,  
barium oxide, dinitrogen tetroxide*

(3)

2. Copy & complete the following word equations.

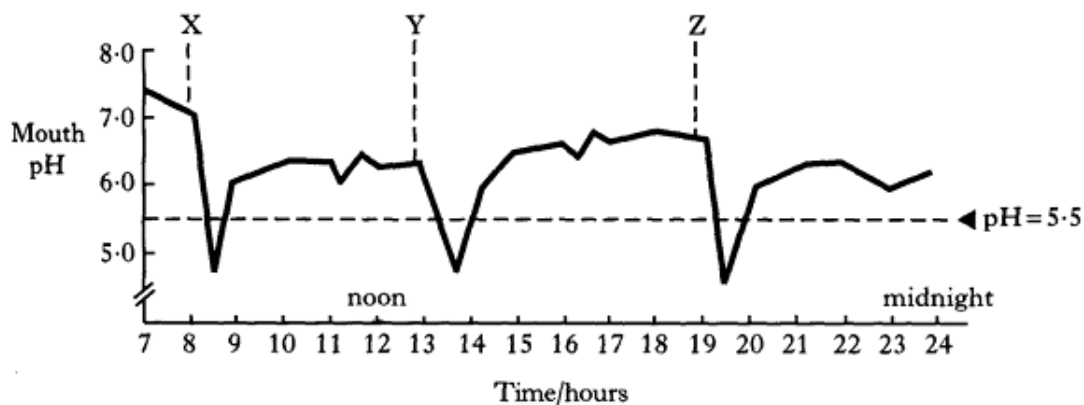
sulfuric acid + potassium hydroxide  $\longrightarrow$  \_\_\_\_\_ + \_\_\_\_\_

\_\_\_\_\_ + sodium hydroxide  $\longrightarrow$  sodium chloride + water

\_\_\_\_\_ + \_\_\_\_\_  $\longrightarrow$  calcium nitrate + water

(3)

3. Ava eats three meals a day. The graph shows how the pH in her mouth varies during the day. X, Y and Z are meal times.



Teeth decay when the pH in the mouth falls below 5.5.

- What happens to the pH in the mouth after meal times?
- Some of Ava's friends eat snacks between meals. Why does this lead to more tooth decay?
- Many toothpastes are alkaline and contain sodium fluoride. Why are toothpastes alkaline?
- Write the formula for sodium fluoride.

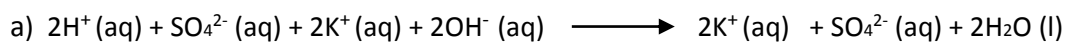
(4)

1. Write balanced ionic equations for:

- a) Copper (II) carbonate and hydrochloric acid  
 b) Magnesium and nitric acid

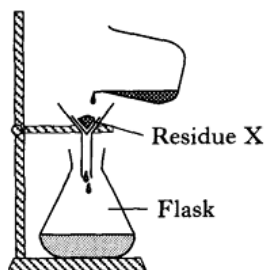
(4)

2. Identify the spectator ions in these equations :



(2)

3. Copper carbonate was added to dilute sulfuric acid in a beaker until no more reacted.

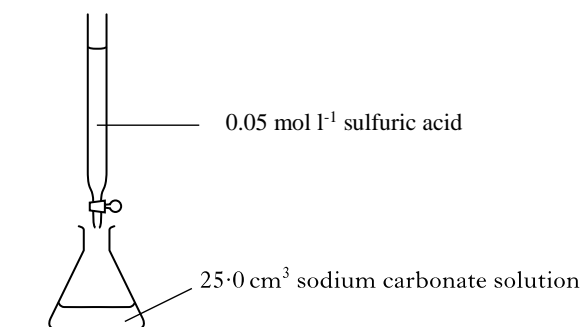


A	copper carbonate, $\text{CuCO}_3$
B	sulfuric acid, $\text{H}_2\text{SO}_4$
C	copper sulfate, $\text{CuSO}_4$
D	carbon dioxide, $\text{CO}_2$
E	water, $\text{H}_2\text{O}$

- a) Identify the residue X.  
 b) Identify the substance(s) which collected in the flask.

(2)

4. A student investigated the reaction between dilute sulfuric acid and sodium carbonate.



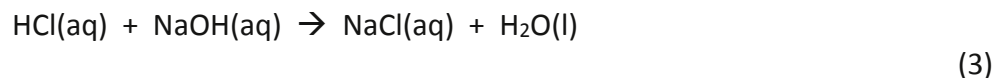
- a) Name the salt produced in the above reaction.  
 b) The results showed that  $20\text{cm}^3$  of sulfuric acid was required to neutralise the sodium carbonate solution.

Calculate the number of moles of sulfuric acid in this volume.

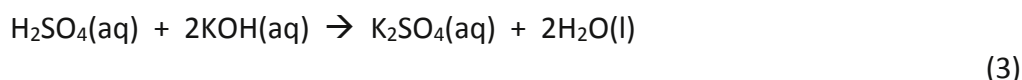
(2)

**Homework 25****Titration****/15**

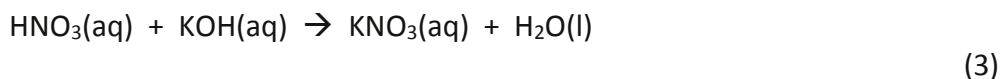
1. What volume of hydrochloric acid (concentration  $0.1 \text{ mol l}^{-1}$ ) is required to neutralise  $50\text{cm}^3$  of sodium hydroxide solution (concentration  $0.2 \text{ mol l}^{-1}$ )?



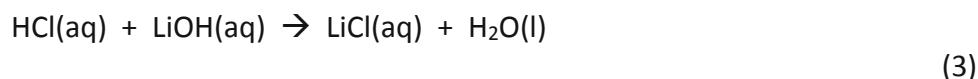
2. What is the concentration of sulfuric acid if  $50\text{cm}^3$  are neutralised by  $25\text{cm}^3$  of potassium hydroxide solution (concentration  $1 \text{ mol l}^{-1}$ )?



3. What volume of nitric acid (concentration  $2 \text{ mol l}^{-1}$ ) is required to neutralise  $20\text{cm}^3$  of potassium hydroxide solution (concentration  $0.5 \text{ mol l}^{-1}$ )?



4. What is the concentration of hydrochloric acid if  $12.6\text{cm}^3$  neutralises  $20\text{cm}^3$  of lithium hydroxide solution (concentration  $0.1 \text{ mol l}^{-1}$ )?



5. What is the concentration of sulfuric acid if  $17.3\text{cm}^3$  neutralises  $25\text{cm}^3$  of sodium hydroxide solution (concentration  $0.5 \text{ mol l}^{-1}$ )?

