**LANGATA HIGH SCHOOL**

**APRIL HOLIDAY ASSIGNMENT**

**FORM THREE APRIL HOLIDAY ASSIGNMENT**

1. Hydrogen reacts with oxygen as shown in the equation

2H2 (g) + 02 (g) → 2H2O (g)

In an experiment 100cm3 of hydrogen gas was mixed with 100cm3 oxygen gas and the mixture heated to form H2O. Which of the gas was in excess and how much. (2 mks)

1. Calculate the amount of calcium carbonate that would remain if 15.0g of calcium carbonate were reacted with 0.2 moles of hydrochloric acid. The equation for the reaction is.CaCo3 + Hcl (aq) → CaCl2(s) + H2O (l) + C02 (g) (C = 12), (O = 16) (Ca = 40) (2 mks)

1. In an experiment 30 cm3 of 0.1 sulphuric acid were reacted with 30 cm3 of 0.1M sodium hydroxide.

(a) Write an equation for the reaction that took place (1 mk)

(b) State the observations that were made when both blue and red litmus were dropped into the mixture (1 mk)

(c) Give a reason for your answer (1 mk)

1. When excess dilute hydrochloric acid was added to sodium sulphite, 960cm3 of sulphur (IV) oxide gas was produced. Calculate the mass of sodium sulphite that was used. (Molar mass of sodium sulphite = 126g: and molar gas volume = 24000 cm3) (3 mks)
2. When “X” cm3 of a solution of 0.5m magnesium nitrate were reacted with excess ammonium carbonate solution, the mass of magnesium carbonate formed was 8.4g.
   1. Write the ionic equation for the reaction that took place (1 mk)
   2. Calculate the value of = “X” (C= 12) (Mg= 24) (O = 16) (2 mks)
3. A certain carbonate of GCO3 react with dilute hydrochloric acid according to the equation given below..GCO3(s) + 2HCl (aq) → CO2 (g) + H2O(l) + GCl2 (aq)

If 1 g of the carbonate reacts completely with 20 cm3 of 1 m hydrochloric acid, calculate the atomic mass of G (3 mks)

1. When 94.5g of hydrated – barium hydroxide Ba(OH) 2: nH2O were heated to a constant mass. 51.3g of anhydrous- barium hydroxide were obtained. Determine the empirical formula of the hydrated barium hydroxide. (Ba = 137.0) (O= 16), (H= 1.0)
2. 15.0 cm3 ethanoic acid (CH3COOH) was dissolved in water to make 500 cm3 of solution. Calculate the concentration of the solution in moles per litre. (C= 12.0; H= 1.0; O = 16.0’ density of ethanoic is 1.05g/cm3 (3 mks)
3. An alkanol has the following composition by mass: Hydrogen 13.5%, oxygen 21.6% and carbon 64. 9%
   1. Determine the empirical formula of the alkanol (C= 12.0; H = 1.0; 0 = 16.0) (2 mks)
   2. Given that empirical formula and the molecular formula of the alkanol are the same, draw the structure of the alkanol (1 mk)
4. 6.84 of aluminium sulphate were dissolved in 150cm‑3 of water. Calculate the molar concentration of the sulphate ions in the solution. (Relative formula mass of aluminum sulphate is 342) (3 mks)
5. When a hydrated sample of calcium sulphate CaSO4. XH2O was lost, the following data was recorded:

Mass of crucible = 30.296g

Mass of crucible + hydrated salt = 33.111g

Mass of crucible + anhydrous salt = 32.781g

Determine the empirical formula of the hydrated salt (relative formula mass of CaSO4= 136, H2O = 18) (3 mks)

1. Phosphoric acid is manufactured from calcium phosphate according to the following equation.

Ca3 (PO4)2(s) + 3H2SO4 (l) →2H3PO4 (aq) + 3CaSO4(s)

Calculate the mass in (kg) of phosphoric acid that would be obtained if 155 kg of calcium phosphate reacted completely with the acid (Ca = 40, P= 31, S = 32, O = 16, H = 1) (2 marks)

1. In an experiment to determine the percentage of magnesium hydroxide in an anti- acid, a solution containing 0.50g of the anti- acid was neutralized by 23.0cm3 of 0.10M hydrochloric acid. (Relative formula mass of magnesium hydroxide =58). Calculate the:

(a) Mass of magnesium hydroxide in the anti- acid (2 mks)

(b) Percentage of magnesium hydroxide in the anti- acid (1 mark)

1. (a) Name one raw material from which sodium hydroxide is manufactured (1 mk)

(b) Sodium hydroxide pellets were accidentally mixed with sodium chloride. 17.6g of the mixture were dissolved in water to make one litre of solution. 100 cm3 of the solution was neutralized by 40 cm3 of 0.5m sulphuric acid.

(i) Write an equation for the reaction that took place (1 mk)

(ii) Calculate the

1. Number of moles of the substance that reacted with sulphuric acid.
2. Number of moles of the substance that would react with acid in the one litre of solution ( 1 mk)

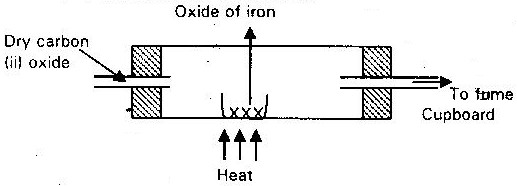
(iii) Mass of the un-reacted substances in the one litre of solution

1. (i) A hydrated salt has the following composition By mass: iron 20.2% Oxygen 23.0% sulphur 11.5% and 45.3% water of = crystallization. If RMM= 278

(ii) Determine the formula of the hydrate salt. ( 2 mks)

(iii) 6.95g of the hydrated salt were dissolved in water and the total volume made up to 250c3 of solution. Calculate the concentration of the salt solution in moles per litres ( 2 mks)

1. 1.9 g of magnesium chloride was dissolved in water. Silver nitrate solution was added till in excess. Calculate the mass of silver nitrate that was added for the complete reaction. (Rmm of magnesium chloride= 95 (m= 14 (O= 16) (Ag = 108).
2. During welding of fractured railway lines by thermite reaction 12g of oxide of iron is reduced by aluminum to 8.4g of iron. Determine the empirical formula of the oxide (Fe= 56) (O= 16) ( 3 mks)
3. Excess Co gas was passed over heated sample of oxide of iron as shown in the diagram. Study the information and answer the questions that follows:



Mass of empty dish = 10.98g

Mass of empty dish + oxide of iron = 13.30g

Mass of empty dish + residue = 12.66g

(i) Determine the formula of the oxide of iron. (RMM of oxide of iron = 232) Fe = 56) (O=16) ( 3 mks)

(ii) Write an equation for the reaction taking place ( 1 mk)

(e) Find the relative atomic mass of M ( 2 mks)

1. Calculate the mass of lead (ii) nitrate that must be heated to give 22.3g of lead (ii) oxide (Pb = 207) (M = 14) (O = 16) ( 3 mks)

1. Calculate the volume of carbon (iv) oxide measured at S.T.P that is evolved when 1 mole of copper (II) carbonate is heated to a constant mass.
2. How many molecules are there in 360 cm3 of nitrogen gas