GREENLAWNS SCHOOL, WORLI

Terminal Examination 2018

CHEMISTRY

Std: X Marks: 80

Date: 21/09/2018 Time: 2 hrs

Answers to this paper must be written on the paper provided separately. You will **not** be allowed to write during the first **10** minutes. This time is to be spent in reading the Question paper. **Section I** is compulsory. Attempt **any four** questions from **Section II**.

SECTION I (40 Marks)

*Attempt **all** questions from this Section*

Question 1

(a) Name the following: [2½]

i. A yellow monoxide that dissolves in hot and concentrated caustic alkali.
ii. An acid which is not an oxidising agent.
iii. An explosive liquid formed when ammonia and chlorine react together.
iv. The most non-metallic element in period 3.
v. The basicity of acetic acid.

(b) Fill in the blanks: [2½]

i. Across a period, the ionisation potential _____
ii. Alkanes are open chain hydrocarbons in which the carbon atoms are joined by _____ only.
iii. The ratio of certain mass of a gas or vapour to the mass of same volume of hydrogen is its _____
iv. The rocky impurities associated with the ore is called _____
v. _____ is a series of organic compounds, where the successive members follow a regular structural pattern.

(c) Arrange the following elements as directed: [2½]

i. Ar, He, Ne (in increasing order of electron shells)
ii. Li, F, C, O (in increasing order of electron affinity)
iii. Cl, Mg, P, Na (in increasing order of atomic size)
iv. Cl, Li, F, N (in increasing order of electronegativity)
v. Cl, S, Al, Na (in increasing order of ionisation potential)

(d) Explain what happens when the following substances are exposed to ordinary air for a long time: [2½]

i. Ferric chloride
ii. Conc. Sulphuric acid
iii. Washing soda (Give reason for i and ii)

(e) What do you observe when:

i. Conc. Nitric acid is added to copper. [½]
ii. Dilute hydrochloric acid is added to sodium thiosulphate. [½]
iii. Solution of sodium chloride is mixed with lead nitrate solution. [½]
iv. A mixture of manganese dioxide and conc. HCl is heated. [½]
v. Ammonium hydroxide is added to zinc nitrate solution in minimum quantities and then in excess. [1]
vi. Conc. Sulphuric acid is added to crystals of sugar. [1]
vii. Sodium hydroxide is reacted with calcium nitrate first in small quantity and then in excess. [1]

(f) Explain the following terms: [5]

i. Avogadro's law
ii. Aqua Regia
iii. Electron affinity
iv. Acid salt
v. Isomerism

(g) Give one chemical test to distinguish between: [3]

i. Iron (II) chloride and Iron (III) chloride
ii. Dilute hydrochloric acid and dilute nitric acid
iii. Dilute sulphuric acid and dilute nitric acid

(h) Distinguish between: [3]

i. Roasting and calcination
ii. Hydroxyl and aldehydic group
iii. Ores of zinc and iron

(i) Draw the structures of: [3]

i. 2-methyl-prop-1-ene
ii. 3-methyl pent-2-ene
iii. But-2-yne

(j) Write balanced equations for the following reactions: [6]

i. Preparation of iron (III) chloride from iron.
ii. Dilute nitric acid and copper.
iii. Conversion of Bauxite to sodium aluminate.
iv. Zinc is heated with sodium hydroxide solution.
v. Reaction of dilute hydrochloric acid and magnesium sulphite.
vi. Action of conc. Sulphuric acid on carbon.

(k) Solve the following numericals:

i. State Gay-Lussac's law. [1]
ii. The percentage composition of a gas is: Nitrogen 82.35%, Hydrogen 17.64%. Find the empirical formula of the gas. (N=14, H=1) [2]
iii. Aluminium carbide reacts with water according to the following equation: [2]
$Al_4C_3 + 12H_2O \rightarrow 4Al(OH)_3 + 3CH_4$ (Al=27, C=12, H=1, O=16)
    1. What mass of aluminium hydroxide is formed from 12g of Al_4C_3
    2. What volume of methane at stp is obtained from 12g of Al_4C_3

SECTION II (40 Marks)

*Attempt **any four** questions from this section*

Question 2

(a) Write a balanced equation for the preparation of the following salts: [2]

i. Zinc carbonate from zinc sulphate
ii. Copper sulphate from copper carbonate

(b) Draw the structural formulae of the two isomers of butene with the correct IUPAC name. [2]

(c) Give one equation to show the following properties of sulphuric acid: [3]

i. As a strong oxidising agent
ii. As a non-volatile acid
iii. Dehydrating property

(d) For the preparation of hydrochloric acid in the laboratory:

i. Why is direct absorption of HCl gas in water not feasible? [½]
ii. What arrangement is done to dissolve HCl gas in water? [½]
iii. Give two advantages of the above arrangement. [2]

Question 3

(a) Iron pyrites → Acidic gas → Sulphur trioxide → Oleum → Sulphuric acid [5]

i. Give balanced equations for all the conversions with necessary conditions.
ii. State why water is added for the conversion 'D' and not for the conversion 'C'?

(b) Galena when roasted reacts according to the following equation: [3]

$$2PbS + O_2 \rightarrow 2PbO + SO_2$$

Calculate:

i. The weight of PbO formed when 478 g of PbS is roasted.
ii. The weight of PbS required to produce 5.6 litres of SO_2 at S.T.P.
iii. The number of moles of oxygen required at the same time.
(Pb = 207, O = 16, S = 32)

(c) Starting from insoluble lead carbonate, how would you obtain insoluble lead chloride. [2]

Question 4

(a) Answer the following with regards to extraction of Aluminium:

i. Convert sodium aluminate to aluminium hydroxide. [1]
ii. What is seeding? [1]
iii. Write the equation for the reaction where the aluminium oxide for the electrolytic extraction of aluminium is obtained by heating aluminium hydroxide. [1]
iv. Name the compounds added to pure alumina to lower the fusion temperature during the electrolytic reduction of alumina. [1]
v. Write the equation for the reaction that occurs at the cathode during the extraction of aluminium by electrolysis. [1]
vi. Explain why it is preferable to use a number of graphite electrodes as anode instead of a single electrode, during the above electrolysis. [1]

(b) A gas cylinder contains 12×10^{24} molecules of oxygen gas. [2]
If Avogadro's number is 6×10^{23}; calculate:

i. The mass of oxygen present in the cylinder.
ii. The volume of oxygen at S.T.P. present in the cylinder. [O=16]

(c) A compound having empirical formula X_2Y is made of two elements X and Y. [2]
Find its molecular formula if the atomic weight of X is 10 and that of Y is 5. The compound has a vapour density 25.

Question 5

(a) A solution has a pH of 7. Explain how you would: [2]

i. Increase its pH
ii. Decrease its pH
iii. If a solution changes the colour of litmus red to blue what can you say about its pH?
iv. What can you say about the pH of a solution that liberates carbon dioxide from sodium carbonate?

(b) Commercial sodium hydroxide weighing 30 g has some sodium chloride in it. The mixture on dissolving in water and subsequent treatment with excess silver nitrate solution formed a precipitate weighing 14.3 g. What is the percentage of sodium chloride in the commercial sample of sodium hydroxide. [2]

$$NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$$

[Relative molecular mass of NaCl = 58; AgCl = 143]

(c) Explain the following: [3]

i. Dilute nitric acid is generally considered a typical acid but not so in its reaction with metals.
ii. Conc. Nitric acid appears yellow when it is left standing in a glass bottle.
iii. An all glass apparatus is used in the laboratory preparation of nitric acid.

(d) State the composition of the following alloys: [3]

i. Duralumin ii. Brass iii. Bronze

Question 6

(a) Give balanced equations for the preparation of the following salts: [2]

i. Zinc sulphide by synthesis
ii. Calcium carbonate from two salt solutions

(b) Give equations for the action of heat on: [2]

i. Ammonium nitrate ii. Potassium nitrate

(c) Name three sulphates and three chlorides that are insoluble in water. [3]

(d) Give reasons for the following:

i. Aluminium oxide is not reduced to aluminium using reducing agents. [1]
ii. About 90% of all known compounds are organic. [2]

Question 7

(a) The following questions pertain to the laboratory preparation of HCl gas:

i. Write the equation for its preparation. [1]
ii. Name the drying agent used and give a reason for your choice. [1]
iii. State a safety precaution taken during the preparation. [1]
iv. How is the gas collected in the laboratory? [1]
v. Give reasons for your above answer. [2]

(b) What mass of silver chloride will be obtained by adding an excess of HCl acid to a solution of 0.34 g of silver nitrate. (Cl=35.5, Ag=108, N=14, O=16, H=1) [2]

(c) Draw the structures of the following: [2]

i. Acetic acid
ii. Dimethyl ether

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