Bombay Scottish School, Mahim

PRELIMINARY EXAMINATION

CHEMISTRY

Std	: 10	Max. Marks	: 80
Date	: 14.01.2019	No. of Questions	: 07
Duration	: 2 hours	No. of Printed sides	: 08

(Answers to this paper must be written on the paper provided separately.)

You will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the Question Paper.

The time given at the head of this paper is the time allowed for writing the answers.

Section 1 is compulsory.

Attempt any four questions from Section 2.

The intended marks for questions or parts of questions are given in brackets [ ].

SECTION 1 [40 marks]

(Attempt all questions from this section.)

Question 1

(a) State your observation in each case: [5]

(i) Lead nitrate is heated in a dry test tube.

(ii) At the cathode during the electrolysis of fused lead bromide using graphite electrodes.

(iii) Washing soda crystals are exposed to the atmosphere.

(iv) A paper dipped in potassium permanganate solution is held at the mouth of the test tube evolving sulphur dioxide gas.

(v) A few drops of Barium chloride solution is added to a solution of magnesium sulphate.

(b) Complete the following sentences by choosing the correct answer from the choices which are given below: [5]

(i) From the following _____ is an alkaline earth metal.

(A) Potassium
(B) Calcium
(C) Lead
(D) Copper

(ii) The reaction which gives copper as a product is: _____

(A) Passing dry ammonia gas over heated copper oxide.
(B) Heating copper oxide
(C) Adding dilute hydrochloric acid to copper oxide.
(D) Passing oxygen over heated copper oxide.

(iii) Electrolysis of concentrated sodium chloride solution using inert electrodes will form _____ at the cathode.

(A) Hydrogen gas
(B) sodium metal
(C) chlorine vapours
(D) oxygen gas

(iv) The formation of hexachloroethane from ethane and chlorine is an example of:

(A) Addition reaction
(B) Substitution reaction
(C) Dehydration reaction
(D) Decomposition reaction

(v) Stainless steel is an alloy of _____

(A) Iron, carbon and manganese
(B) Iron, chromium, nickel and carbon.
(C) Iron, chromium, manganese and nickel
(D) Iron, nickel and carbon

(c) Give balanced chemical equation for each: [5]

(i) Dilute nitric acid is made to react with zinc oxide.
(ii) Copper turnings are added to concentrated nitric acid.
(iii) Acetic acid reacts with ethanol in the presence of concentrated sulphuric acid.
(iv) Dilute hydrochloric acid reacts with sodium sulphite.
(v) Obtaining sulphuric acid from nitric acid. (State the conditions)

(d) Name the gas in each case: [5]

(i) A mixture of sodium propanoate and soda lime is heated in a test tube.
(ii) Green vitriol is gently heated in a dry test tube.
(iii) Sodium reacts with methanol at room temperature.
(iv) Potassium chloride is heated with concentrated sulphuric acid at a temperature below 200°C.
(v) Reaction of aluminium with boiling concentrated caustic alkali solution.

(e) Commercial sodium hydroxide weighing 30g has some sodium chloride in it. The mixture on dissolving in water and subsequent treatment with excess silver nitrate solution formed a precipitate weighing 14.3g. what is the percentage of sodium chloride in the commercial sample of sodium hydroxide? The equation for the reaction is: [1]

$NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

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

(f) Give the structural formula of the two isomers of butane. [2]

(g) Give reasons for the following: [5]

(i) Inert gases do not form ions.

(ii) Ethene is more reactive than ethane.

(iii) The oxidising power of elements increase on moving from left to right along a period in the periodic table.

(iv) An aqueous solution of sodium chloride conducts electricity.

(v) During electrolysis of molten lead bromide a graphite anode is preferred to other electrodes.

(h) A gaseous hydrocarbon contains 82.76% of carbon. Find its molecular formula, given that its vapour density is 29. [C=12, H=1] [2]

(i) Acids dissolve in water to form positively charged ions. Draw the structure of this ion and name the ion. [1]

(j) Answer the following : [5]

(i) Why is hydrogen chloride termed as a polar covalent compound?

(ii) Why is a cation always smaller than the parent atom from which it is formed?

(iii) State two observations made during the catalytic oxidation of ammonia.

(iv) Which property of sulphuric acid accounts for its use as a dehydrating agent?

(k) Draw an electron dot diagram to show the formation of each of the following compounds; [2]

(i) Carbon tetrachloride

(ii) Magnesium chloride

[C = 6, Mg = 12, Cl = 17]

(l) A strip of copper is placed in four different colourless salt solutions. [1]
They are KNO_3, $AgNO_3$, $Zn(NO_3)_2$ and $Ca(NO_3)_2$.
Which one of the solutions will finally turn blue? Justify your answer with a suitable reason.

(m) If 6 litres of hydrogen and 4 litres of chlorine are mixed and exploded and if water is added to the gases formed, find the volume of the residual gas. [1]

Section 2 (40 marks)
(Attempt any four questions from this section)

Question 2

(a) [3]

(i) Write the equation for the formation of ammonia gas by the action of hot water on magnesium nitride.

(ii) How is ammonia gas collected in the laboratory? Justify your answer with suitable reasons.

(iii) Name the compound normally used as a drying agent for ammonia gas.

(b) [2]

(i) Give a balanced equation with the necessary conditions for the laboratory preparation of nitric acid from potassium nitrate.

(ii) What is the special feature of the apparatus used in (i). Justify your answer with a suitable reason.

(c) The following questions are related to the extraction of aluminium: [5]

(i) Name the solution used to react with bauxite as a first step in obtaining pure aluminium oxide in the Baeyer's process and also give a suitable reason for the addition of this solution.

(ii) During the extraction of aluminium by electrolysis answer the following:

(A) Along with cryolite and alumina, another substance is added to the electrolytic mixture. Name the substance and give one reason for the addition.

(B) Why is the electrolyte covered with powdered coke?

(C) Why is it preferable to use a number of graphite electrodes as anode instead of a single electrode?

Question 3

(a) Which property of hydrogen chloride gas is demonstrated by the fountain experiment? [1]

(b) (i) Draw a neat labelled diagram to show the arrangement used in the laboratory preparation of hydrochloric acid in which HCl gas is dissolved in water.
(ii) Why is such an arrangement necessary? Give one reason. [2]

(c) State the property of concentrated sulphuric acid exhibited in each of the following reactions: [4]
(i) Reaction with sulphur
(ii) Reacts with blue vitriol
(iii) Reaction with carbon
(iv) Produces a gas that fumes in air.

(d) Identify the process or substance based on the description given below: [3]
(i) The process used to separate ore from gangue by preferential wetting.
(ii) The process of heating the concentrated ore to a high temperature in the presence of air.
(iii) The most common ore of iron.

Question 4

(a) The following questions are with reference to the electrolysis of acidified water using platinum electrodes. [2]
(i) Why is dilute sulphuric acid preferred over dilute nitric acid to acidify water?
(ii) Give the equation for the discharge of ions at the anode.

(b) Give two applications of electrolysis in which the anode diminishes in mass. [2]

(c) A silversmith wants to electroplate an article with silver. To achieve this : [2]
(i) Name the electrolyte to be chosen for the above electroplating.
(ii) Why should a low current be passed for a long period of time?

(d) Identify the cation in each case: [2]
(i) NH_4OH solution when added to solution (B) gives white precipitate which does not dissolve in excess.
(ii) NaOH solution when added to solution (C) gives white precipitate which is insoluble in excess.

(e) Explain the following: [1]
During the Contact process for the manufacture of sulphuric acid, why is sulphur trioxide not directly dissolved in water to obtain sulphuric acid?

(f) Copy and complete the following table : [1]

	Anode	Electrolyte
Purification of copper		

Question 5

(a) Consider the section of the periodic table given below: [6]

Group number	1 IA	2 IIA	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 Zero
Period 2	Li		D	T	E	Q	L	
Period 3	M	Mg		Si		Z	G	Y
Period 4	R	J				W		

(1) In this table some elements are given in their own symbol and position in the periodic table that is : Li, Mg and Si.
(2) Some other elements are shown with letters. You must see the position of the element in the periodic table.

Answer the following, with reference to the table:

(i) What is the valency of E.?
(ii) Which element from period 2 will have the least Ionization potential?
(iii) What is the electronic configuration of the element in the third period which gains one electron to change into an anion?
(iv) Write the formula of the compound formed between M and Z.
(v) Compare the size of the atoms of M and G. Which one is less? Justify your answer with a suitable reason.
(vi) In the compound formed between J and Q, name the type of bond that will be formed.

(b) Identify the substances P, Q and R based on the information given below: [3]

(i) The deliquescent salt P, turns yellow on dissolving in water and gives a reddish brown precipitate with sodium hydroxide solution.
(ii) The white crystalline solid Q is soluble in water. It liberates a pungent smelling gas when heated with sodium hydroxide solution.
(iii) On performing the flame test salt R produces a lilac coloured flame and its solution gives a white precipitate with silver nitrate solution, which is soluble in ammonium hydroxide solution.

(c) Name the alloy of lead and tin that is used in electrical circuits: [1]

Question 6

(a) The preparation of the salt lead sulphate from lead carbonate is a two step process. Give two balanced equations to show the above conversion. [2]

(b) If HX is a weak acid, what particles will be present in its dilute solution apart from those of water? [1]

(c) (i) Calculate the number of gram atoms in 13.8 grams of sodium. (Na = 23) [1]

(ii) A gas cylinder can hold 1kg of hydrogen at room temperature and pressure: [2]

[A] Find the number of moles of hydrogen present.

[B] What weight of carbon dioxide can the cylinder hold under similar conditions of temperature and pressure? (H=1, C=12, O=16)

(d) Give balanced chemical equation with the necessary conditions for each of the following: [4]

(i) Reaction of acetic acid with sodium hydroxide solution.

(ii) Complete combustion of ethane.

(iii) Obtaining methyl alcohol by the hydrolysis of methyl bromide.

(iv) Formation of 1, 2 - Dichloro ethane from ethylene.

Question 7

(a) Choosing the substances from the list given in the box below, write balanced equations for the laboratory preparation of the given salts: (i to v) [5]

Copper (II) Carbonate	Chlorine
Zinc nitrate	Sodium
Sodium chloride	Iron
Sodium carbonate	Copper
Dilute sulphuric acid	

salts:

(i) Sodium sulphate

(ii) Zinc carbonate

(iii) Copper (II) Sulphate

(iv) Iron (II) sulphate

(v) Ferric chloride

(b) Samples of the gases O_2, N_2, CO_2 and CO under the same conditions of temperature and pressure contain the same number of molecules represented by X. The molecules of oxygen (O_2) occupy V litres and have a mass of 8g. Under the same conditions of temperature and pressure:

(i) What is the volume occupied by –
3X molecules of CO? [1]

(ii) What is the mass of CO_2 in grams?
(C = 12, O = 16) [1]

(c) From the equation [2]

$$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} Cr_2O_3 + 4H_2O + N_2$$

Calculate :

(i) The volume of nitrogen evolved at STP when 63gm of ammonium dichromate is heated.

(ii) The mass of chromium (III) oxide formed at the same time.
(N = 14, H = 1, Cr = 52, O = 16)

(d) State Gay Lussacs Law. [1]