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JEE | MEDICAL-UG | BOARDS | KVPY | NTSE | OLYMPIADS

X - ICSE BOARD - 2018

Date: 19.03.2018

CHEMISTRY - QP + SOLUTIONS

SECTION - I (40 Marks)

Attempt all questions from this Section

Question 1

(a) Choose the correct answer from the options given below :

(i) The salt solution which does not react with ammonium hydroxide is :

(A) Calcium Nitrate

(B) Zinc Nitrate

(C) Lead Nitrate

(D) Copper Nitrate

Ans. (D) Copper Nitrate

Topic: Acid, base and salt_Subtopic: Salt_Level: Easy_Std. X_ICSE Board / Chemistry

(ii) The organic compound which undergoes substitution reaction is :

(A) C_2H_2

(B) C_2H_4

(C) $C_{10}H_{18}$

(D) C_2H_6

Ans. (D)

C_2H_6 - ethane is saturated hydrocarbon which undergoes substitution reaction.

Topic: Organic chemistry_Subtopic: Hydrocarbon_Level: Easy_Std. X_ICSE Board / Chemistry

(iii) The electrolysis of acidified water is an example of :

(A) Reduction

(B) Oxidation

(C) Redox reaction

(D) Synthesis

Ans. (C)

Redox reaction, as water undergoes oxidation and reduction at anode and cathode respectively.

Topic: Electrochemistry_Subtopic: Electrolysis_Level: Easy_Std. X_ICSE Board / Chemistry

(iv) The IUPAC name of dimethyl ether is :

(A) Ethoxy methane

(B) Methoxy methane

(C) Methoxy ethane

(D) Ethoxy ethane

Ans. (B)

$CH_3 - O - CH_3$ (Methoxy methane)

Topic: Organic chemistry_Subtopic: Nomenclature_Level: Easy_Std. X_ICSE Board / Chemistry

(v) The catalyst used in the contact process is :

- (A) Copper (B) Iron
(C) Vanadium pentoxide (D) Manganese dioxide

Ans. (C)

V_2O_5 is used in contact process.

Topic: Acid, base and salt_Subtopic: Acid_Level: Easy_Std. X_ICSE Board / Chemistry

(b) Give one word or a phrase for the following statements :

- (i) The energy released when an electron is added to a neutral gaseous isolated atom to form a negatively charged ion.

Ans. Electron affinity or electron gain enthalpy.

Topic: Periodic table_Subtopic: Property_Level: Easy_Std. X_ICSE Board / Chemistry

- (ii) Process of formation of ions from molecules which are not in ionic state.

Ans. Ionization

Topic: Periodic table_Subtopic: Property_Level: Easy_Std. X_ICSE Board / Chemistry

- (iii) The tendency of an element to form chains of identical atoms.

Ans. Catenation - It's a self linking.

Property of atoms like carbon to give long chains of carbon.

Topic: Organic chemistry_Subtopic: Property_Level: Easy_Std. X_ICSE Board / Chemistry

- (iv) The property by which certain hydrated salts, when left exposed to atmosphere, lose their water of crystallization and crumble into powder.

Ans. Dehydration

Topic: Acid, base and salt_Subtopic: Salt_Level: Easy_Std. X_ICSE Board / Chemistry

- (v) The process by which sulphide ore is concentrated.

Ans. Froth floatation

Topic: Metal & non-metal_Subtopic: Extraction of metal_Level: Easy_Std. X_ICSE Board / Chemistry

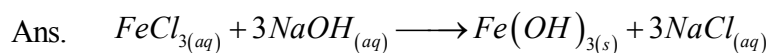
(c) Write a balanced chemical equation for each of the following :

- (i) Action of concentrated sulphuric acid on carbon.

Ans. $C_{(s)} + H_2SO_4 \xrightarrow{conc.} CO_2 + 2SO_2 + 2H_2O$

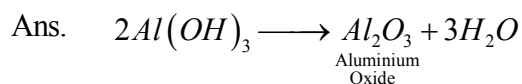
Topic: Acid, base and salt_Subtopic: Acid_Level: Medium_Std. X_ICSE Board / Chemistry

(ii) Reaction of sodium hydroxide solution with iron (III) chloride solution.



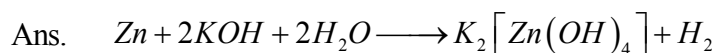
Topic: Acid, base and salt_Subtopic: Base_Level: Medium_Std. X_ICSE Board / Chemistry

(iii) Action of heat on aluminium hydroxide.



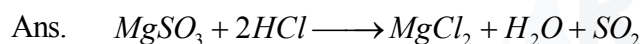
Topic: Metal & Non-metal_Subtopic: Extraction of metal_Level: Tough_Std. X_ICSE Board / Chemistry

(iv) Reaction of zinc with potassium hydroxide solution.



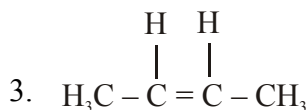
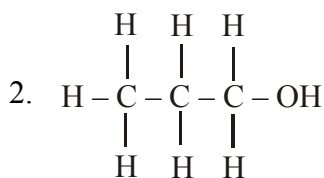
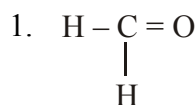
Topic: Metal & non-metal_Subtopic: Reaction of metal_Level: Tough_Std. X_ICSE Board / Chemistry

(v) Action of dilute hydrochloric acid on magnesium sulphite.



Topic: Acid, base and salt_Subtopic: Salt_Level: Tough_Std. X_ICSE Board / Chemistry

(d) (i) Give the IUPAC name for each of the following :

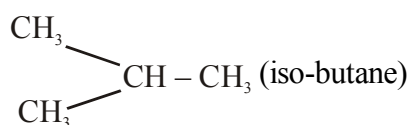


(ii) Write the structural formula of the two isomers of butane.

Ans. (i) IUPAC Names :

1. Methanol 2. Propanol 3. But-2-ene

(ii) $CH_3 - CH_2 - CH_2 - CH_3$ (n-butane)

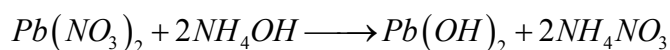


Topic: Organic chemistry_Subtopic: Nomenclature & Isomer_Level: Medium_Std. X_ICSE Board / Chemistry

(e) State one relevant observation for each of the following :

(i) Lead nitrate solution is treated with sodium hydroxide solution drop wise till it is excess.

Ans. ppt. of lead hydroxide is observed



Topic:Analytical chemistry_Subtopic:Cation detection_Level:Tough_Std. X_ICSE Board / Chemistry

(ii) At the anode, when molten lead bromide is electrolyzed using graphite electrodes.

Ans. Brown fumes of bromine gas are observed at anode.

Topic:Electrochemistry_Subtopic:Electrolysis_Level:Medium_Std. X_ICSE Board / Chemistry

(iii) Lead nitrate solution is mixed with dilute hydrochloric acid and heated.

Ans. White ppt. of $PbCl_2$ is formed.

Topic:Analytical chemistry_Subtopic:Cation detection_Level:Tough_Std. X_ICSE Board / Chemistry

(iv) Anhydrous calcium chloride is exposed to air for some time.

Ans. Anhydrous $CaCl_2$ on exposure to atmosphere form solution.

Topic:Acid, base and salt_Subtopic:Salt_Level:Medium_Std. X_ICSE Board / Chemistry

(v) Barium chloride solution is slowly added to sodium sulphate solution.

Ans. White ppt. of barium sulphate is formed solution turns turbid.

Topic:Acid, base and salt_Subtopic:Salt_Level:Easy_Std. X_ICSE Board / Chemistry

(f) Give a reason for each of the following :

(i) Ionic compounds have a high melting point.

Ans. Ionic compounds have alternatively arranged cations and anions to give closely packed structure and balanced forces. A lot of energy is needed to break strong ionic bonds therefore ionic compounds are high melting.

Topic:Chemical bonding_Subtopic:Ionic bonding_Level:Easy_Std. X_ICSE Board / Chemistry

(ii) Inert gases do not form ions.

Ans. Inert gases have stable completely filled orbitals hence they do not loose or gain electron to form ions.

Topic:Chemical bonding_Subtopic:Property_Level:Easy_Std. X_ICSE Board / Chemistry

(iii) Ionisation potential increases across a period, from left to right.

Ans. From left to right in periodic table, atomic size decreases smaller the size more the effective nuclear charge. Therefore more energy is required to remove an electron from atom therefore ionization potential increases.

Topic:Periodic table_Subtopic:Ionisation potential_Level:Easy_Std. X_ICSE Board / Chemistry

(iv) Alkali metals are good reducing agents.

Ans. Alkali metals have large size and single electron in valence shell. This e^- can be easily lost therefore alkali metals are good reducing agents (e^- donors)

Topic:Periodic table_Subtopic:Property_Level:Medium_Std. X_ICSE Board / Chemistry

(v) Conductivity of dilute hydrochloric acid is greater than that of acetic acid.

Ans. Acetic acid is weak electrolyte which dissociated partially where as HCl is strong electrolyte which dissociate completely therefore HCl is better conductor compared to CH_3COOH .

Topic:Acid, base and salt_Subtopic:Acid_Level:Easy_Std. X_ICSE Board / Chemistry

(g) Name the gas that is produced in each of the following cases :

- (i) Sulphur is oxidized by concentrated nitric acid.
- (ii) Action of dilute hydrochloride acid on sodium sulphide.
- (iii) Action of cold and dilute nitric acid on copper.
- (iv) At the anode during the electrolysis of acidified water.
- (v) Reaction of ethanol and sodium.

Ans. (i) SO_2

(ii) H_2S

(iii) NO_2

Topic:Analytical chemistry_Subtopic:Detection of gas_Level:Easy_Std. X_ICSE Board / Chemistry

(iv) O_2

Topic:Electrochemistry_Subtopic:Electrolysis_Level:Easy_Std. X_ICSE Board / Chemistry

(v) H_2

Topic:Metal & Non-metal_Subtopic:Properties_Level:Easy_Std. X_ICSE Board / Chemistry

(h) Fill up the blanks with the correct choice given in brackets.

(i) Ionic or electrovalent compounds do not conduct electricity in their _____ state. (fused/solid)

Ans. Solid

Topic:Chemical bonding_Subtopic:Property_Level:Easy_Std. X_ICSE Board / Chemistry

(ii) Electrolysis of aqueous sodium chloride solution will form _____ at the cathode.

(Hydrogen gas / Sodium metal)

Ans. Hydrogen gas

Topic:Electrochemistry_Subtopic:Electrolysis_Level:Easy_Std. X_ICSE Board / Chemistry

(iii) Dry hydrogen chloride gas can be collected by _____ displacement of air. (downward / upward)

Ans. Downward

Topic: Metal & Non-metal Subtopic: Preparation of hydrogen Level: Easy Std. X ICSE Board / Chemistry

(iv) The most common ore of iron is _____. (Calcium / Haematite)

Ans. Haematite

Topic: Metal & Non-metal Subtopic: Ore Level: Easy Std. X ICSE Board / Chemistry

(v) The salt prepared by the method of direct combination is _____.

(iron (II) chloride / iron (III) chloride)

Ans. Iron (III) chloride

Topic: Acid, base and salt Subtopic: Salt Level: Difficult Std. X ICSE Board / Chemistry

SECTION - II (40 Marks)

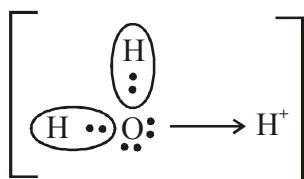
Attempt any four questions from this Section

Question 2

- (a) (i) What do you understand by a lone pair of electrons?
 (ii) Draw the electron dot diagram of Hydronium ion (H = 1; O = 8)

Ans. (i) Lone pair of electrons are those valence electrons which do not take part in bonding and remain nonbonded.

(ii) Hydronium ion $[H_3O^{\oplus}]$



Topic: Chemical bonding Subtopic: Lewis theory Level: Easy Std. X ICSE Board / Chemistry

- (b) In Period 3 of the Periodic Table, element B is placed to the left of element A.

On the basis of this information, choose the correct word from the brackets to complete the following statements:

- (i) The element B would have (lower / higher) metallic character than A.
 (ii) The element A would probably have (lesser / higher) electron affinity than B.
 (iii) The element A would have (greater / smaller) atomic size than B.

Ans. Periodic table

- (i) Higher - Metallic character decreases from left to right.
- (ii) Higher - Electron affinity increases from left to right.
- (iii) Smaller - Atomic size decreases from left to right.

Topic:Periodic table_Subtopic:Property_ Level:Easy_Std. X_ICSE Board / Chemistry

(c) Copy and complete the following table which refers to the conversion of ions to neutral particles.

| Conversion | Ionic equation | Oxidation / Reduction |
|-----------------------------------|----------------|-----------------------|
| Chloride ion to chlorine molecule | (i) _____ | (ii) _____ |
| Lead (II) ion to lead | (iii) _____ | (iv) _____ |

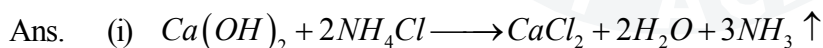
Ans.

| Conversion | Ionic equation | Oxidation / Reduction |
|-----------------------------------|---------------------------------------|-----------------------|
| Chloride ion to chlorine molecule | (i) $2Cl^- \rightarrow Cl_2 + 2e^-$ | (ii) Oxidation |
| Lead (II) ion to lead | (iii) $Pb^{+2} + 2e^- \rightarrow Pb$ | (iv) Reduction |

Topic:Electrochemistry_Subtopic:Reaction_ Level:Easy_Std. X_ICSE Board / Chemistry

Question 3

- (a) (i) Write the balanced chemical equation to prepare ammonia gas in the laboratory by using an alkali.
- (ii) State why concentrated sulphuric acid is not used for drying ammonia gas.
- (iii) Why is ammonia gas not collected over water ?

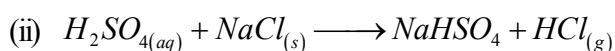


- (ii) As ammonia gas is basic in nature it forms ammonium sulphate salt.
- (iii) Ammonia gas is highly soluble in water. Therefore it is not collected over water.

Topic:Metal & Non-metal_Subtopic:Preparation of ammonia_ Level:Easy_Std. X_ICSE Board / Chemistry

- (b) (i) Name the acid used for the preparation of hydrogen chloride gas in the laboratory. Why is this particular acid preferred to other acids?
- (ii) Write the balanced chemical equation for the laboratory preparation of hydrogen chloride gas.

Ans. (i) H_2SO_4 (Sulphuric acid is used for preparation of HCl gas in laboratory). H_2SO_4 has dehydrating properties so act as dehydrating agent.



Topic:Acid, base and salt_Subtopic:Acid_ Level:Medium_Std. X_ICSE Board / Chemistry

- (c) For the preparation of hydrochloric acid in the laboratory:
- Why is direct absorption of hydrogen chloride gas in water not feasible?
 - What arrangement is done to dissolve hydrogen chloride gas in water?

Ans. (i) The reaction is highly exothermic.
 (ii) As the reaction is exothermic, the installation is called HCl over or burner. The HCl gas is absorbed in deionized water resulting in chemically pure HCl.

Topic: Acid, base and salt_Subtopic: Acid_Level: Medium_Std. X_ICSE Board / Chemistry

- (d) For the electro-refining of copper :
- What is the cathode made up of?
 - Write the reaction that takes place at the anode.

Ans. (i) Pure copper metal
 (ii) Reaction at anode -



Topic: Metal & Non-metal_Subtopic: Refining of metal_Level: Easy_Std. X_ICSE Board / Chemistry

Question 4

- (a) The percentage composition of a gas is:
 Nitrogen 82.35%, Hydrogen 17.64%.
 Find the empirical formula of the gas. [N = 14, H = 1]

Ans. No. of mole of nitrogen = $\frac{82.35}{14} = 5.88$
 No. of mole of Hydrogen = $\frac{17.64}{1} = 17.64$

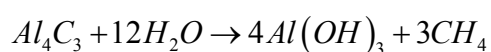
The ratio of their mole is 5.88:17.64

1 : 3

So the empirical formula is NH_3

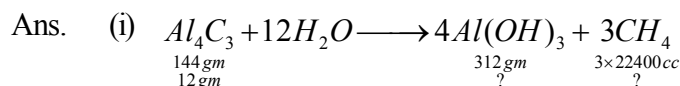
Topic: Mole concept_Subtopic: Empirical formula_Level: Easy_Std. X_ICSE Board / Chemistry

- (b) Aluminum carbide reacts with water according to the following equation :



- What mass of aluminum hydroxide is formed from 12g of aluminum carbide ?
- What volume of methane at s.t.p. is obtained from 12g of aluminum carbide?

[Relatively molecular weight of $Al_4C_3 = 144$; $Al(OH)_3 = 78$]



So, the amount of $Al(OH)_3$ formed will be 26 gm

(ii) From 12 gm Al_4C_3 5600 cc methane will be formed.

Topic: Mole concept Subtopic: Numerical Level: Easy Std. X ICSE Board / Chemistry

- (c) (i) If 150 cc of gas A contains X molecules, how many molecules of gas B will be present in 75 cc of B?
The gases A and B are under the same conditions of temperature and pressure.
- (ii) Name the law on which the above problem is based.

Ans. (i) According to Avogadro's law equal volume of gases contain equal no. of molecules of same temperature and pressure.

So, 150 cc B will also contain X molecules, and 75 cc will contain X/2 molecules.

(ii) Avogadro's law

Topic: Mole concept Subtopic: Avogadro's law Level: Easy Std. X ICSE Board / Chemistry

(d) Name the main component of the following alloys:

- (i) Brass
(ii) Duralumin

Ans. Brass → Copper and Zinc

Duralumin → Copper, Manganese and Magnesium

Topic: Metal & Non-metal Subtopic: Alloy Level: Easy Std. X ICSE Board / Chemistry

Question 5

(a) Complete the following table which relates to the homologous series of hydrocarbons.

| General Formula | IUPAC name of the homologous series | Characteristic bond type | IUPAC name of the first member of the series |
|-----------------|-------------------------------------|--------------------------|--|
| C_nH_{2n-2} | (A) _____ | (B) _____ | (C) _____ |
| C_nH_{2n+2} | (D) _____ | (E) _____ | (F) _____ |

Ans. (A) Alkyne (B) $-C \equiv C-$ (C) Ethyne

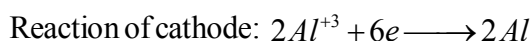
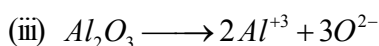
(D) Alkane (E) $\begin{matrix} | & | \\ -C & -C- \\ | & | \end{matrix}$ (F) Methane

Topic: Organic chemistry Subtopic: Hydrocarbons Level: Easy Std. X ICSE Board / Chemistry

- (b) (i) Name the most common ore of the metal aluminum from which the metal is extracted. Write the chemical formula of the ore.
- (ii) Name the process by which impure ore of aluminum gets purified by using concentrated solution of an alkali.
- (iii) Write the equation for the formation of aluminum at the cathode during the electrolysis of alumina.

Ans. (i) The most common ore of Al is bauxite. Chemical formula is Al_2O_3 .

(ii) The process is called Bayer process.

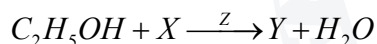


Topic: Metal & Non-metal **Subtopic: Preparation of aluminium** **Level: Medium** **Std. X** **ICSE Board / Chemistry**

Question 6

- (a) A compound X (having vinegar like smell) when treated with ethanol in the presence of the acid Z, gives a compound Y which has a fruity smell.

The reaction is:



- (i) Identify Y and Z.
- (ii) Write the structural formula of X.
- (iii) Name the above reaction.

Ans. (i) Y is ester $CH_3COOC_2H_5$ (Ethyl ethanoate)

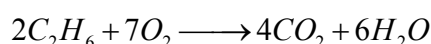
Z is concentrated H_2SO_4

(ii) X is CH_3COOH

(iii) Esterification reaction

Topic: Analytical chemistry **Subtopic: Qualitative analysis** **Level: Easy** **Std. X** **ICSE Board / Chemistry**

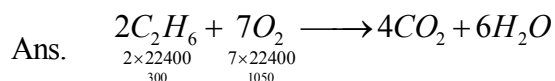
- (b) Ethane burns in oxygen to form CO_2 and H_2O according to the equation:



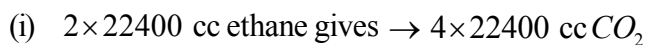
If 1250 cc of oxygen is burnt with 300 cc of ethane.

Calculate:

- (i) the volume of CO_2 formed.
- (ii) the volume of unused O_2



So, ethane is limiting reagent.



$$\therefore 300 \text{ cc ethane gives } \rightarrow \frac{4 \times 22400 \times 300}{2 \times 22400} \text{ cc } CO_2$$

$$= 600 \text{ cc } CO_2$$

(ii) For 300 cc Ethane 1050 cc of O_2 will be required.

So, unused O_2 is $(1250 - 1050) = 200$ cc

Topic: Mole concept Subtopic: Numerical Level: Easy Std. X ICSE Board / Chemistry

(c) Three solutions P, Q and R have pH value of 3.5, 5.2 and 12.2 respectively. Which one of these is a:

- (i) Weak acid?
- (ii) Strong alkali?

Ans. (i) Q having pH 5.2 is weak acid
(ii) R having pH 12.2 is strong alkali.

Topic: Acid, base and salt Subtopic: Acid Level: Easy Std. X ICSE Board / Chemistry

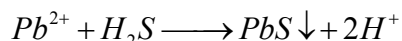
Question 7

(a) Give a chemical test to distinguish between the following pairs of chemicals:

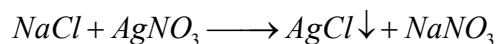
- (i) Lead nitrate solution and Zinc nitrate solution
- (ii) Sodium chloride solution and Sodium nitrate solution

Ans. (i) Lead nitrate and Zinc nitrate solution can be distinguished by passing H_2S in solution.

$Pb(NO_3)_2$ will give black precipitate of PbS whereas $Zn(NO_3)_2$ will not.



(ii) $NaCl$ and $NaNO_3$ solution can be distinguished simply by addition of $AgNO_3$ solution into it $NaCl$ solution will give white precipitate of $AgCl$ whereas $NaNO_3$ will not.

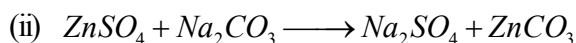
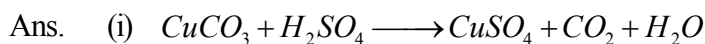


Topic: Analytical chemistry Subtopic: Qualitative analysis Level: Medium Std. X ICSE Board / Chemistry

(b) Write a balanced equation for the preparation of each of the following salts:

(i) Copper sulphate from Copper carbonate.

(ii) Zinc carbonate from Zinc sulphate.

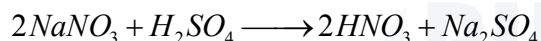


Topic: Acid, base and salt_Subtopic: Salt_Level: Medium_Std. X_ICSE Board / Chemistry

(c) (i) What is the type of salt formed when the reactants are heated at a suitable temperature for the preparation of Nitric acid?

(ii) State why for the preparation of Nitric acid, the complete apparatus is made up of glass.

Ans. (i) Sodium or potassium nitrate on reaction with H_2SO_4 can produce nitric acid in that case sulphate salt will be prepared.



(ii) Because nitric acid will not react with glass.

Topic: Acid, base and salt_Subtopic: Preparation of nitric acid_Level: Medium_Std. X_ICSE Board / Chemistry

(d) Which property of sulphuric acid is shown by the reaction of concentrated sulphuric acid with:

(i) Ethanol?

(ii) Carbon?

Ans. (i) Sulphuric acid acts as a dehydrating agent while reaction with ethanol.

(ii) With carbon it will act as oxidizing reagent.

Topic: Acid, base and salt_Subtopic: Property_Level: Medium_Std. X_ICSE Board / Chemistry