

# ICSE Solved Paper 2018

## Chemistry

### Class-X

(Maximum Marks : 80)

(Time allowed : Two hours)

Answer 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 I** is compulsory. Attempt **any four** questions from **Section II**.

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

#### SECTION-I

(40 marks)

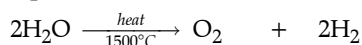
Attempt all questions from this Section.

1. (a) Choose the correct answer from the options given below: [5]
- (i) The salt solution which does not react with ammonium hydroxide is:  
(a) Calcium Nitrate (b) Zinc Nitrate  
(c) Lead Nitrate (d) Copper Nitrate
- (ii) The organic compound which undergoes substitution reaction is:  
(a) C<sub>2</sub> H<sub>2</sub> (b) C<sub>2</sub> H<sub>4</sub>  
(c) C<sub>10</sub> H<sub>18</sub> (d) C<sub>2</sub> H<sub>6</sub>
- (iii) The electrolysis of acidified water is an example of:  
(a) Reduction (b) Oxidation  
(c) Redox reaction (d) Synthesis
- (iv) The IUPAC name of dimethyl ether is:  
(a) Ethoxy methane  
(b) Methoxy methane  
(c) Methoxy ethane  
(d) Ethoxy ethane
- (v) The catalyst used in the Contact Process is:  
(a) Copper  
(b) Iron  
(c) Vanadium pentaoxide  
(d) Manganese dioxide
- (b) Give one word or a phrase for the following statements: [5]
- (i) The energy released when an electron is added to a neutral gaseous isolated atom to form a negatively charged ion.  
(ii) Process of formation of ions from molecules which are not in ionic state.  
(iii) The tendency of an element to form chains of identical atoms.  
(iv) The property by which certain hydrated salts, when left exposed to atmosphere, lose their water of crystallization and crumble into powder.  
(v) The process by which sulphide ore is concentrated.

Ans. (i) Option (d) is correct

- (ii) (d) C<sub>2</sub>H<sub>6</sub> Because Ethane is a saturated hydrocarbon and have C – C and C – H sigma bond only

(iii) Option (c) is correct



at anode at cathode

Oxidation and reduction of water takes place

(iv) Option (b) is correct

Methoxy methane

(v) Option (c) is correct

V<sub>2</sub>O<sub>5</sub> (Vanadium Pentaoxide) is used in contact process.

Ans. (i) Electron affinity or electron gain enthalpy.

(ii) ionisation

(iii) catenation

(iv) Efflorescence

(v) Froth flotation

(c) Write a balanced chemical equation for each of the following: [5]

(i) Action of concentrated sulphuric acid on carbon.

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

(iii) Action of heat on aluminium hydroxide.

(iv) Reaction of zinc with potassium hydroxide solution.

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

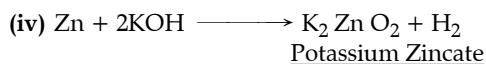
Ans. (i)  $\text{C} + 2\text{H}_2\text{SO}_4 \longrightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$

(ii)  $\text{FeCl}_3 + 3\text{NaOH} \longrightarrow \text{Fe(OH)}_3 + 3\text{NaCl}$   
red ppt.

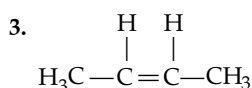
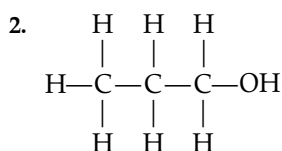
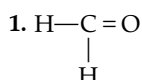
[Insoluble hydroxide]

(iii)  $2\text{Al(OH)}_3 \xrightarrow{\text{Alumina}} \text{Al}_2\text{O}_3 + 3\text{H}_2\text{O}$

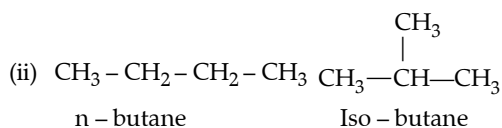
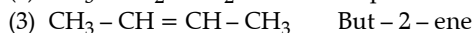
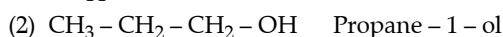
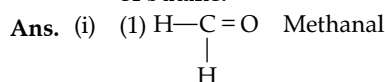
Alumina



(d) (i) Give the IUPAC name for each of the following: [5]



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



(e) State one relevant observation for each of the following: [5]

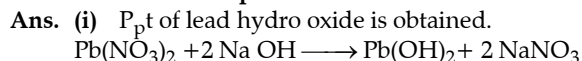
(i) Lead nitrate solution is treated with sodium hydroxide solution drop wise till it is in excess.

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

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

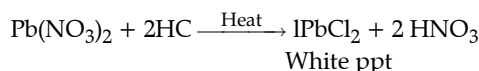
(iv) Anhydrous calcium chloride is exposed to air for some time.

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

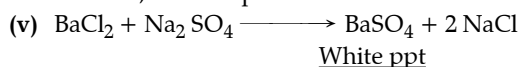


(ii)  $\text{Br}_2$  gas is released with brown fumes

(iii) White ppt of  $\text{PbCl}_2$  is formed.



(iv) Since  $\text{CaCl}_2$  is deliquescent substance. So it absorbs sufficient water from air to allow it to dissolve, when exposed to air for some time.



(f) Give a reason for each of the following: [5]

(i) Ionic compounds have a high melting point.

(ii) Inert gases do not form ions.

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

(iv) Alkali metals are good reducing agents.

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

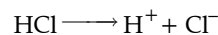
Ans. (i) In ionic solids, the constituent particles are positive and negative ions. These ions are held together by strong electrostatic forces of attraction. so, they have high melting point.

(ii) On account of highly stable configuration in the valency shell, these elements have no tendency either to lose, gain or share electrons with the atoms of other elements.

(iii) As we move from left to right in the periodic table, atomic size decreases and effective nuclear charge increases. so, ionisation potential increases.

(iv) Alkali metals have low value of ionisation potential. so, they can lose electron easily. so, they act as good reducing agent.

(v)  $\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{H}^+$   
 Weak electrolyte  
 (Poorly-dissociate)



Strong electrolyte

(Completely dissociate)

HCl is strong electrolyte and almost completely dissociated while  $\text{CH}_3\text{COOH}$  is weak electrolyte and very poorly dissociated. so, number of ions produced in case of HCl is greater as compared to  $\text{CH}_3\text{COOH}$ . Hence, HCl has greater conductivity as compare to  $\text{CH}_3\text{COOH}$ .

(g) Name the gas that is produced in each of the following cases: [5]

(i) Sulphur is oxidised by concentrated nitric acid.

(ii) Action of dilute hydrochloric 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)  $\text{SO}_2$

(ii)  $\text{H}_2\text{S}$

(iii)  $\text{O}_2$

(iv)  $\text{H}_2$

(v)  $\text{H}_2$

(h) Fill up the blanks with the correct choice given in brackets. [5]

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

(ii) Electrolysis of aqueous sodium chloride solution will form \_\_\_\_\_ at the cathode. (*hydrogen gas / sodium metal*)

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

(iv) The most common ore of iron is \_\_\_\_\_. (*calamine / haematite*)

- (v) The salt prepared by the method of direct combination is \_\_\_\_\_. (iron (II) chloride / iron (III) chloride)

Ans. (i) Solid

- (ii) H<sub>2</sub> (hydrogen gas)  
 (iii) Downward  
 (iv) haematite  
 (v) Iron (III) Chloride

## SECTION-II

(40 marks)

Attempt any four questions from this Section.

- 2.(a) (i) What do you understand by a lone pair of electrons? [3]

- (ii) Draw the electron dot diagram of Hydronium. (H=1; O=8)

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

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.

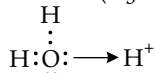
- (iii) The element A would have (greater / smaller) atomic size than B.

- (c) Copy and complete the following table which refers to the conversion of ions to neutral particles. [4]

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

- Ans. (a) (i) Those valence electrons which does not participate in the bond formation and remain in non bonded state are called lone pair of electrons.

- (ii) Hydronium ion (H<sub>3</sub>O<sup>+</sup>)



- (b) (i) Higher metallic character because metallic character decreases from left to right across the period. (higher)

- (ii) Higher electron affinity because electron affinity increases from left to right across the period. (higher)

- (iii) Smaller size because atomic size decreases from left to right across the period. (smaller)

(c)

Conversion	Ionic Equation	Oxidation / Reduction
Chloride ion to chlorine molecule	(i) $2\text{Cl}^- \xrightarrow{1500^\circ\text{C}} \text{Cl}_2 + 2\text{e}^-$	(ii) oxidation
Lead (II) ion to lead	(iii) $\text{Pb}^{+2} + 2\text{e}^- \xrightarrow{\text{---}} \text{Pb}$	(iv) reduction

- 3.(a) (i) Write the balanced chemical equation to prepare ammonia gas in the laboratory by using an alkali. [3]

- (ii) State why concentrated sulphuric acid is not used for drying ammonia gas.

- (iii) Why is ammonia gas not collected over water?

- (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? [3]

- (ii) Write the balanced chemical equation for the laboratory preparation of hydrogen chloride gas.

- (c) For the preparation of hydrochloric acid in the laboratory.

- (i) Why is direct absorption of hydrogen chloride gas in water not feasible?

- (ii) What arrangement is done to dissolve hydrogen chloride gas in water?

- (d) For the electro-refining of copper?

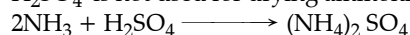
- (i) What is cathode made up of

- (ii) Write the reaction that takes place at the anode.

- Ans. (a) (i)  $\text{Ca}(\text{OH})_2 + 2\text{NH}_4\text{Cl} \longrightarrow \text{CaCl}_2 + 2\text{H}_2\text{O} + 2\text{NH}_3\uparrow$

Slaked lime

- (ii) Ammonia is basic in nature. It reacts with H<sub>2</sub>SO<sub>4</sub> to form ammonium sulphate salt. so, conc. H<sub>2</sub>SO<sub>4</sub> is not used for drying ammonia gas.



ammonium sulphate

- (iii) Ammonia is highly soluble in water. so, ammonia gas is not collected over water.

- (b) (i) H<sub>2</sub>SO<sub>4</sub> is used for the preparation of HCl gas in laboratory because it also acts as dehydrating agent.

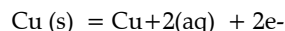
- (ii)  $2\text{NaCl}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq.}) \xrightarrow{1500^\circ\text{C}} \text{Na}_2\text{SO}_4(\text{aq.}) + 2\text{HCl}(\text{g})$

- (c) (i) The reaction is highly exothermic .

- (ii) As the reaction is exothermic, the installation is called HCl over burner is used. The HCl gas is absorbed in water resulting in chemically pure HCl.

- (d) (i) Thin sheets of pure copper.

- (ii) Reaction at anode :



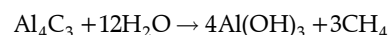
- 4.(a) The percentage composition of a gas is:

Nitrogen 82.35%, Hydrogen 17.64%

Find the empirical formula of the gas.

[N=14, H=1]

- (b) Aluminium carbide reacts with water according to the following equation: [4]



- (i) What mass of aluminium hydroxide is formed from 12g of aluminium carbide?

- (ii) What volume of methane at S.T.P, is obtained from 12g of aluminium carbide?  
[Relative molecular weight of  $\text{Al}_4\text{C}_3 = 144$ ;  $\text{Al}(\text{OH})_3 = 78$ ]
- (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? [2]  
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.
- (d) Name the main component of the following alloys: [2]  
(i) Brass  
(ii) Duralumin

Ans.

Element	Symbol	Percentage of elements	At mass of limits	moles = $\frac{\text{percentage}}{\text{at mass}}$	Simplest molar ratio	Simplest whole as molar ratio
Nitrogen	N	82.35	14	$\frac{82.35}{14} = 5.88$	$\frac{5.88}{17.64} = 0.33$	1
Hydrogen	H	17.64	1	$\frac{17.64}{1} = 17.64$	$\frac{17.64}{17.64} = 1$	3

- (a) The percentage composition of a gas is  
N = 82.35 %  
H = 17.64 %  
So, the empirical formula of the gas is  $\text{NH}_3$
- (b) (i)  $\text{Al}_4\text{C}_3 + 12\text{H}_2\text{O} \longrightarrow 4\text{Al}(\text{OH})_3 + 3\text{CH}_4$   
molecular weight of  $\text{Al}_4\text{C}_3 = 144$   
molecular weight of  $\text{Al}(\text{OH})_3 = 78$   
From the above reaction . We conclude that  
1 mole of  $\text{Al}_4\text{C}_3$  gives 4 moles of  $\text{Al}(\text{OH})_3$   
144 g of  $\text{Al}_4\text{C}_3$  gives  $4 \times 78$  g of  $\text{Al}(\text{OH})_3$
- (ii) So 12 g of  $\text{Al}_4\text{C}_3$  gives  $\frac{4 \times 78 \times 12}{144} = 26$  g of  $\text{Al}(\text{OH})_3$
- So 26 g of  $\text{Al}(\text{OH})_3$  is obtained from 12g of  $\text{Al}_4\text{C}_3$
- (ii) From the above reaction we conclude that  
 $\therefore$  1 mole of  $\text{Al}_4\text{C}_3$  gives 3 moles of  $\text{CH}_4$   
So 12 g of  $\text{Al}_4\text{C}_3$  gives  $\frac{3 \times 22400 \times 12}{144}$  of  $\text{CH}_4$  at S.T.P.
- (b) (i) Name the most common ore of the metal aluminium from which the metal is extracted. Write the chemical formula of the ore. [4]  
(ii) Name the process by which impure ore of aluminium gets purified by using concentrated solution of an alkali.  
(iii) Write the equation for the formation of aluminium at the cathode. During the electrolysis of alumina.

Ans. (a)

General Formula	IUPAC name of the Homologous series	Characteristic bond type	IUPAC name of the first member of the series
$\text{C}_n\text{H}_{2n-2}$	(A) Alkyne	(B) $-\text{C} \equiv \text{C}-$	(C) Ethyne
$\text{C}_n\text{H}_{2n+2}$	(D) Alkane	(E) $\begin{array}{c}   &   \\ -\text{C}- & \text{C}- \\   &   \end{array}$	(F) Methane

- (c) (i) According to Avogadro's law equal volumes of all gases under similar conditions of temperature and pressure contain equal number of molecules. So, 150 cc of B will also contain X molecule. So, 75 cc of B will contain  $\frac{X}{2}$  molecule.
- (ii) Avogadro's Law.
- (d) (i) Brass  $\longrightarrow$  Copper and Zinc  
(ii) Duralumin  $\longrightarrow$  Copper, Manganese and Magnesium, Aluminium
5. (a) Complete the following table which relates to the homologous series of hydrocarbons. [6]

General formula	IUPAC name of the homologous series	Characteristic bond type	IUPAC name of the first member of the series
$\text{C}_n\text{H}_{2n-2}$	(A) _____	(B) _____	(C) _____
$\text{C}_n\text{H}_{2n+2}$	(D) _____	(E) _____	(F) _____

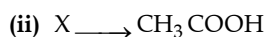
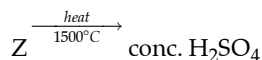
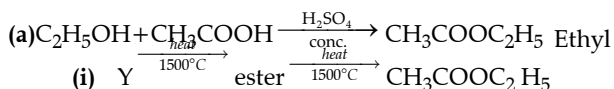
- (b) (i) The most common ore of Al is bauxite chemical formula is  $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$   
(ii) Balyer's process.  
(iii)  $\text{Al}_2\text{O}_3 \rightleftharpoons \text{Al}^{+3} + \text{AlO}_3^{3-}$   
 $\text{Al}^{3+} + 3\text{e}^- \longrightarrow \text{Al}$  (At cathode)
- 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. [4]  
The reaction is:  
 $\text{C}_2\text{H}_5\text{OH} + \text{X} \xrightarrow{\text{Z}} \text{Y} + \text{H}_2\text{O}$
- (i) Identify Y and Z.  
(ii) Write the structural formula of X.  
(iii) Name the above reaction.
- (b) Ethane burn in oxygen to form  $\text{CO}_2$  and  $\text{H}_2\text{O}$  according to the equation:  
 $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$ . [4]  
If 1250 cc of oxygen is burnt with 300 cc of ethane. Calculate:  
(i) the volume of  $\text{CO}_2$  formed.

- (ii) the volume of unused  $O_2$ .  
 (c) Three solutions P, Q and R have pH value of 3.5, 5.2 and 12.2 respectively. [2]

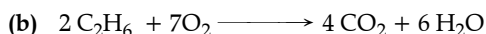
Which one of these is a:

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

Ans.



(iii) Esterification



- (i) 2 moles of ethane reacts with 7 moles of  $O_2$ .  
 $2 \times 22400$  cc of ethane reacts with  $7 \times 22400$  cc of oxygen.

For 1250 cc of oxygen, the ethane required 357.14 cc. So ethane is limiting reagent here.

$2 \times 22400$  cc of ethane gives  $4 \times 22400$  cc of  $CO_2$   
 So 300 cc of ethane gives  $4 \times 22400 \times 300$  cc of  $CO_2$

$$2 \times 22400$$

So,  $CO_2$  released = 600 cc.

- (ii) Volume of unused  $O_2 = 1250 - 1050 = 200$  cc because 300 cc of ethane requires 1050 CC of  $O_2$ .

- (c) (i) Q having pH 5.2 is weak acid  
 (ii) R having pH 12.2 is strong alkali  
 7. (a) Give a chemical test to distinguish between the following pairs of chemicals: [4]  
 (i) Lead nitrate solution and Zinc nitrate solution.  
 (ii) Sodium chloride solution and Sodium nitrate solution.

- (b) Write a balanced equation for the preparation of each of the following salts: [4]

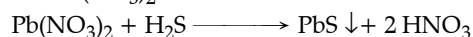
- (i) Copper sulphate from Copper carbonate.  
 (ii) Zinc carbonate from Zinc sulphate.

- (c) (i) What is the type of salt formed when the reactants are heated at a suitable temperature for the preparation of Nitric acid? [2]

(ii) Give Reason - The complete apparatus is made up of glass for the preparation of Nitric Acid.

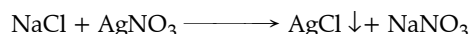
- (d) Which property of sulphuric acid is shown by the reaction of concentrated sulphuric acid with: [2]  
 (i) Ethanol.  
 (ii) Carbon.

- Ans. (a) (i) Lead nitrate and Zinc nitrate solution can be distinguished by passing  $H_2S$  in solution.  $Pb(NO_3)_2$  will give black ppt of  $PbS$  while  $Zn(NO_3)_2$  does not.

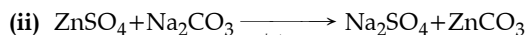


black ppt

- (ii)  $NaCl$  and  $NaNO_3$  solution can be distinguished simply by the addition of  $AgNO_3$  solution into  $NaCl$  solution and  $NaNO_3$  solution.  $NaCl$  gives white ppt of  $AgCl$  where as  $NaNO_3$  will not.

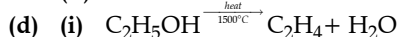


white ppt



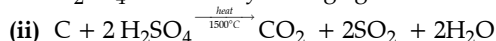
- (c) (i)  $2NaNO_3 + H_2SO_4 \xrightarrow[1500^\circ C]{heat} 2HNO_3 + Na_2SO_4$   
 Sulphate salts will be prepared.

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



Ethanol

$H_2SO_4$  acts as dehydrating agent.




$H_2SO_4$  oxidises carbon and acts as oxidising agent.





## Don't Stop Reading !

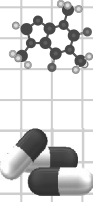
You never know what might be asked in the exam.



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