

ICSE Solved Paper 2022 Semester-1

Chemistry

Class-X

(Maximum Marks : 40)

(Time allowed : One hour)

You will **not** be allowed to write during the first 10 minutes

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

ALL QUESTIONS ARE COMPULSORY

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

Select the correct option for each of the following questions.

1. In the Periodic Table, elements of Period 3 are arranged in the increasing order of ionization potential as: [1]

- (a) B, N, Cl, Ar (b) Mg, Si, S, Ar
(c) Ar, Si, S, Mg (d) Si, Ar, Cl, Mg

Ans. Option (b) is correct

Explanation : Ionization energy generally increases across period 3 because of increasing nuclear charge while shielding of the outer electrons remains relatively same. Thus, correct order will be Mg, Si, S, Ar.

2. If Relative Molecular Mass of Butane (C₄H₁₀) is 58 then, its vapour density will be: [1]

- (a) 58 (b) 29
(c) 32 (d) 16

Ans. Option (b) is correct

Explanation : Molecular mass = 2 × vapour density
58 = 2 × vapour density

$$\therefore \text{Vapour density of C}_4\text{H}_{10} = \frac{58}{2} = 29$$

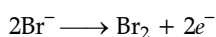
3. Identify one statement that holds true for electrolysis of molten lead bromide: [1]

- (a) Silver grey metal deposits at the anode.
(b) Temperature is not maintained during the electrolysis.
(c) Brown vapours of bromine are obtained at the anode.
(d) Electrolyte contains H⁺ ions along with Pb²⁺ ions.

Ans. Option (c) is correct

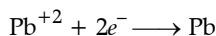
Explanation : On electrolysis of molten lead bromide,

At anode:



(Reddish brown vapours)

At cathode:



So, brown vapour of bromine are obtained at anode.

4. The tendency of an atom to attract shared pair of electrons to itself when forming a chemical bond is known as: [1]

- (a) Electron affinity
(b) Electronegativity
(c) Ionization potential
(d) Nuclear charge

Ans. Option (b) is correct

Explanation : Electronegativity is a chemical property that describes the tendency of an atom to attract electrons towards itself to form chemical bonds.

5. Solid sodium chloride does not conduct electricity as: [1]

- (a) The strength of the bond is weak.
(b) It contains free ions.
(c) It does not contain any free ions.
(d) It contains free ions as well as molecules.

Ans. Option (c) is correct

Explanation : Solid sodium chloride has closely packed structure due to strong electrostatic force of attraction and the ions are immobile, i.e., it does not contain any free ions, thus conduction of electricity is not possible.

6. Elements A and B have electronic configurations 8 and 13 respectively. The chemical formula formed between A and B will be: [1]

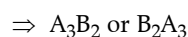
- (a) AB
(b) B₃A₃
(c) A₂B₃
(d) B₂A₃

Ans. Option (d) is correct

Explanation : Elements A & B have electronic configurations or number of protons 8 & 13 respectively. Therefore, they will have 6 & 3 valence electrons respectively and will form A²⁻ & B³⁺ ion respectively. Thus, molecular formula will be

Symbol: A \times B

Charge: 2 \blacktriangleleft \blacktriangleright 3



7. The percentage of hydrogen present in NaOH is: (Relative Molecular Mass of NaOH = 40)

(At. Wt. of H = 1) [1]

- (a) 2.5 (b) 25
(c) 0.25
(d) 0.025

Ans. Option (a) is correct

Explanation: Molar mass of NaOH = 23 + 16 + 1 = 40 u

% composition of Hydrogen will be = $\frac{1}{40} \times 100 = 2.5\%$

8. A salt formed by incomplete neutralisation of an acid by a base: [1]

- (a) Basic salt (b) Acid salt
(c) Normal salt (d) Complex salt

Ans. Option (b) is correct

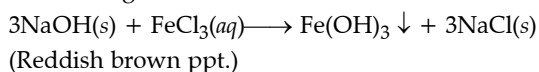
Explanation: A salt formed by incomplete neutralization of an acid by a base is Acid Salt. An acidic salt contains one replaceable hydrogen and reacts with base to neutralised. Example: NaHCO_3 , NaHSO_4 etc.

9. The colour of the precipitate formed after the addition of a small amount of sodium hydroxide solution to an aqueous solution of ferric chloride is: [1]

- (a) gelatinous white
(b) pale blue
(c) reddish brown
(d) dirty green

Ans. Option (c) is correct

Explanation: When small amount of NaOH is added to an aqueous ferric chloride solution, a reddish brown precipitate of ferrous hydroxide is formed as given in chemical reaction.



- *10. Alkaline earth metals have the same: [1]

- (a) number of valence electrons
(b) number of shells
(c) metallic property
(d) ionisation potential

11. Which of the following compounds neither dissociate nor ionise in water? [1]

- (a) Hydrochloric acid
(b) Sodium hydroxide
(c) Potassium Nitrate
(d) Carbon tetrachloride

Ans. Option (d) is correct

Explanation: Carbon tetrachloride is a non polar covalent compound and it does not have any positively and negatively charged ions thus, it neither dissociate nor ionise in water.

12. The table shows the electronic configuration of four elements. [1]

Element	Electronic configuration
W	2, 6
X	2, 8
Y	2, 8, 1
Z	2, 8, 7

Which pair of atoms will form a covalent compound?

- (a) two atoms of W
(b) two atoms of X
(c) an atom of W and an atom of X
(d) an atom of Y and an atom of Z

Ans. Option (a) is correct

Explanation: We know that covalent bonds are formed by sharing electrons between the two atoms.

Thus, element W and element Z having 2, 6 & 2, 8, 7 electronic configuration respectively. They accept electrons to form ionic as well as covalent bonds.

While X has inert electronic configuration that form neither ionic nor covalent bonds and element Y is an alkali metal that donates one electron to form ionic compounds. hence, it does not form covalent bond.

- *13. Element with an atomic number 19 will: [1]

- (a) accept an electron and get oxidised
(b) accept an electron and get reduced
(c) lose an electron and get oxidised
(d) lose an electron and get reduced

14. Which of the following has two sets of lone pair of electrons in them? [1]

- (a) Ammonia
(b) Methane
(c) Water
(d) Ammonium ion

Ans. Option (c) is correct

Explanation: In water, oxygen has six valence electrons and therefore, it requires two additional electrons from two hydrogen atoms to complete its octet. This also leaves two-pairs of lone pair of electrons.

15. If the empirical mass of the formula PQ_2 is 10 and the Relative Molecular Mass is 30, then the molecular formula will be: [1]

- (a) PQ_2 (b) P_3Q_2
(c) P_6Q_3 (d) P_3Q_6

Ans. Option (d) is correct

Explanation: Relative molecular mass (given) = 30

Empirical mass = 10

Since, $n = \frac{\text{Molecular mass}}{\text{Empirical mass}}$

$$n = \frac{30}{10} = 3$$

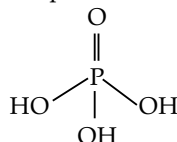
Now, molecular formula of PQ_2 will be
 = (Empirical formula) $_n$
 = $(PQ_2)_3 = P_3Q_6$

16. Which of the following is a tribasic acid? [1]

- (a) H_2SO_4
 (b) $Al(OH)_3$
 (c) H_3PO_4
 (d) $Ca(OH)_2$

Ans. Option (c) is correct

Explanation : H_3PO_4 is a tribasic acid because it can donate all the three protons attached to it.

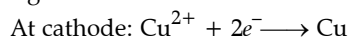


17. If a solution of an electrolyte mixture has calcium ions, cupric ions, zinc ions and magnesium ions, which of these ions would you see preferentially discharged at the cathode? [1]

- (a) Calcium ions
 (b) Zinc ions
 (c) Cupric ions
 (d) Magnesium ions

Ans. Option (c) is correct

Explanation : As we know that at cathode, reduction takes place. Thus, cupric ions preferentially discharged at cathode as reduction potential of cupric ion is highest.



18. Which of the following ions will readily discharge at the anode during the electrolysis of acidified water? [1]

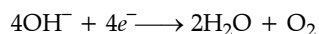
- (a) OH^{-}
 (b) SO_4^{2-}
 (c) Cl^{-}
 (d) H^{+}

Ans. Option (a) is correct

Explanation :

During electrolysis of acidified water, the SO_4^{2-} ions complete with the OH^{-} ions to release their electrons

to the anode. The SO_4^{2-} ions have higher discharge potential while OH^{-} ions are much better reducing agents and are preferentially released as oxygen gas and water.



19. If the empirical formula of a compound is CH and its vapour density is 13, then its molecular formula will be: (At. Wt. C = 12, H = 1) [1]

- (a) CH
 (b) C_2H_2
 (c) C_4H_4
 (d) C_3H_3

Ans. Option (b) is correct

Explanation : given, Empirical formula = CH

Vapour density = 13

Molecular weight = $2 \times$ vapour density
 = $2 \times 13 = 26$

Now, $n = \frac{\text{Molecular formula mass}}{\text{Empirical formula mass}} = \frac{26}{13} = 2$

Thus molecular formula of given compound will be:

(Empirical formula) $_n$

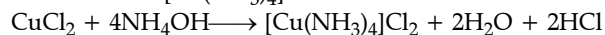
= $(CH)_2 = C_2H_2$ or $CH \equiv CH$

20. Aqueous solution of cupric chloride forms a deep blue solution on addition of: [1]

- (a) dropwise sodium hydroxide
 (b) excess sodium hydroxide
 (c) dropwise ammonium hydroxide
 (d) excess ammonium hydroxide

Ans. Option (d) is correct

Explanation : On adding excess of ammonium hydroxide to a cupric chloride solution, a deep blue solution of $[Cu(NH_3)_4]^{2+}$ ion is formed.



*21. Which statement about conduction of electricity is correct? [1]

- (a) Electricity is conducted in aqueous solution by electrons.
 (b) Electricity is conducted in a metal wire by ions
 (c) Electricity is conducted in a molten electrolyte by electrons.
 (d) Electricity is conducted in an acid solution by ions.

22. If an element has low ionization potential, then it is likely to be a: [1]

- (a) metal
 (b) metalloid
 (c) non metal
 (d) inert gas

Ans. Option (a) is correct

Explanation : Metals have low ionization potential because they can easily lose electrons and become cationic.

23. Which electron arrangement for the outer shell electrons in a covalent compound is correct? [1]

- (a) $\begin{array}{c} \times \times \\ H \times \quad \cdot \cdot \\ \cdot \cdot \end{array} \begin{array}{c} \cdot \cdot \\ Cl : \\ \cdot \cdot \end{array}$
 (b) $\begin{array}{c} \times \times \\ \times H \times \\ \times \times \end{array} \begin{array}{c} \cdot \cdot \\ \cdot \cdot \\ \cdot \cdot \end{array}$
 (c) $\begin{array}{c} \cdot \cdot \\ H \times \quad N \times H \\ \times \\ H \end{array}$
 (d) $\begin{array}{c} \cdot \cdot \\ H \times \quad N \times H \\ \times \\ H \end{array}$

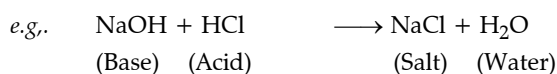
Ans. Option (c) is correct

Explanation : In nitrogen, there are 5 valence electrons in its outermost shell in which three electrons are shared with three hydrogen atoms and two lone pair of electrons at top of nitrogen.

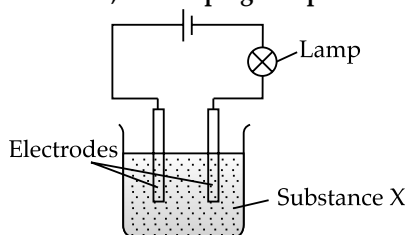
24. The products formed when an acid reacts with a base is: [1]
- salt and hydrogen
 - salt and oxygen
 - salt and water
 - salt and carbon dioxide

Ans. Option (c) is correct

Explanation: The reaction of an acid with a base is called a neutralization reaction and the products of this reaction are salt and water.



25. In the circuit below, the lamp lights up. [1]



What could X be?

- a solution of alcohol in water
- a solution of sodium chloride in water
- sugar solution
- solid potassium chloride

Ans. Option (b) is correct

Explanation : In the circuit, the Substance X can be a solution of sodium chloride in water because NaCl dissociate in Na^+ and Cl^- ions and these two ions move towards their respective electrodes and on closing the circuit, the lamp lights up.

- *26. Which one of the following is a non-metallic cation? [1]

- K^+
- NH_4^+
- Cu^{2+}
- Na^+

27. Type of bonding present in hydrogen chloride: [1]

- metallic
- ionic
- covalent
- coordinate

Ans. Option (c) is correct

Explanation : In hydrogen chloride, hydrogen atom shares an electron with chlorine atom and covalent bond is formed because covalent bond is the bond associated with two non-metals.

28. The non-metallic properties of elements from left to right in a Periodic Table: [1]

- increases
- decreases
- remains same
- first increases and then decreases

Ans. Option (a) is correct

Explanation : On moving from left to right in a periodic table, non-metallic characters increase due to increase in ionization enthalpy.

29. The aqueous solution that contains both ions and molecules: [1]

- sulphuric acid
- nitric acid
- acetic acid
- hydrochloric acid

Ans. Option (c) is correct

Explanation : Aqueous solution of acetic acid contains both ions and molecules as it is weak electrolyte so it dissociates very less and forms few ions while all others are strong electrolytes so they dissociates completely and forms ions.

30. The basic oxide which is an alkali: [1]

- Copper oxide
- Sodium oxide
- Ferric oxide
- Zinc oxide

Ans. Option (b) is correct

Explanation : Sodium oxide in an alkali basic oxide which react with water to form hydroxide.



31. If the pH of a solution is '2', then the solution is a: [1]

- strong acid
- strong alkali
- weak acid
- weak alkali

Ans. Option (a) is correct

Explanation : If the pH of a solution is 2, then the solution is a strong acid because lower the value in pH scale represent. the more strength, of acidity.

32. The acidity of aluminium hydroxide is: [1]

- 3
- 1
- 4
- 2

Ans. Option (a) is correct

Explanation : Aluminium hydroxide $[\text{Al}(\text{OH})_3]$ when reacts with any acid then it required three acidic H^+ ions to neutralize therefore, its acidity is 3.



Thus, acidity of aluminium hydroxide is 3.

- *33. Hydracids are those acids which contain: [1]

- Hydrogen with any metal
- Hydrogen, a non-metal and oxygen
- Hydrogen and a non-metal other than oxygen
- Hydrogen and oxygen only

34. The oxidation reaction among the following is: [1]

- $\text{Fe}^{3+} + 3e^- \rightarrow \text{Fe}$
- $\text{Fe}^{2+} - 1e^- \rightarrow \text{Fe}^{3+}$
- $\text{Cl}_2 + 2e^- \rightarrow 2\text{Cl}^-$
- $\text{Cu}^{2+} + 2e^- \rightarrow \text{Cu}$

Ans. Option (b) is correct

Explanation : The oxidation reaction is a reaction, where oxidation number increased. Thus in option (b), oxidation number increase as $\text{Fe}^{2+} - e^- \longrightarrow \text{Fe}^{3+}$. While in all other options, oxidation, number decreased thus all other options are reduction reactions. In Other worlds, In Option (b), it losses an electron while all in all other options, it gains an electron.

35. A student added excess of sodium hydroxide solution to each of the salt solutions listed below. An insoluble precipitate formed was observed in: [1]

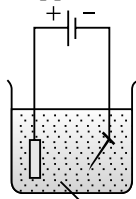
- (a) Calcium nitrate (b) Zinc nitrate
(c) Lead nitrate (d) Sodium nitrate

Ans. Option (a) is correct

Explanation : When excess of NaOH solution added to each of salt solutions given in the options, then with calcium nitrate, an insoluble precipitate was formed and with others, soluble precipitate was observed.

36. Which apparatus could be used to electroplate an iron nail with copper? [1]


(a)



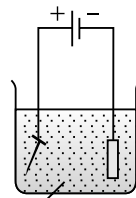
Aqueous copper (II) sulphate

Key

 = copper sheet

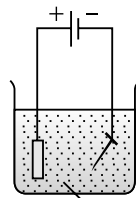
 = iron nail

(b)



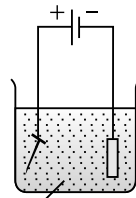
Aqueous copper (II) sulphate

(c)



Aqueous iron (II) sulphate

(d)



Aqueous iron (II) sulphate

Ans. Option (a) is correct

Explanation : In option (a), on closing of circuit, copper will be deposited at iron nail as migration of metal ions via a solution from a positive electrode to a negative one.

37. The table below shows the electronic arrangements of six atoms, A to F.

Atom	A	B	C	D	E	F
Electronic configuration	2, 5	2	2, 6	2, 8, 6	2, 8, 8	2, 8, 3

With respect to the table select the following:

(i) Two atoms from the same group of the periodic table: [1]

- (a) D and E (b) C and D
(c) E and F (d) C and E

(ii) Two noble gases: [1]

- (a) A and B (b) E and F
(c) B and E (d) D and E

(iii) The atom which is the most electronegative: [1]

- (a) A (b) B
(c) C (d) F

(iv) The atom which has the highest ionization potential: [1]

- (a) A (b) B
(c) E (d) F

Ans. (i) (b) Because in atom C and D, the no. of valence electrons are same i.e., 6, which

indicate the same group of periodic table.

(ii) (c) B and E atoms represent noble gas configuration as their outermost shell having complete their duplet (in case of Helium) and octet.

(iii) (c) Electronegativity means ability of an atom to attract shared electrons to itself. Thus, option (c) is most electronegative because in a period an moving from left to right, electronegativity increases and on moving down in a group, electronegativity decreases.

(iv) (d) Atom B is an inert gas element, has highest ionization potential because it has small size and having complete duplet thus, it's very hard to remove an electron from outermost shell.