

**General Instructions:**

- \* All questions are compulsory.
- \* This question paper consists of 33 questions.
- \* Question number 1 to 3 are MCQs carrying 1 mark each.
- \* Question number 4, 5 & 6 are MCQs having more than one correct answers carrying 1 mark each.
- \* Question number 7 & 8 are fill in the blanks questions and carrying 1 mark each.
- \* Question number 9 & 10 are TRUE & FALSE questions carrying one mark each.
- \* Question number 11& 12 are MATCHING TYPE questions carrying one mark each.
- \* Question number 13 & 14 are ASSERTION & REASONING TYPE question carrying one mark each.
- \* Question number 15 -21 are short answer questions carrying 2-marks each.
- \* Question number 22-30 are also short answer questions carrying 3-marks each.
- \* Question number 31-33 are long answer questions carrying 5-marks each.
- \* use log tables, if necessary. Use of calculators is not allowed.

1. If 500 mL of a 5M solution is diluted to 1500 mL, what will be the molarity of the solution obtained?

(i)1.5 M

(ii)1.66 M

(iii)0.017 M

(iv)1.59 M

Or

If the concentration of glucose ( $C_6H_{12}O_6$ ) in blood is  $0.9 \text{ g L}^{-1}$ , what will be the molarity of glucose in blood?

(i)5 M

(ii)50 M

(iii)0.005 M

(iv)0.5 M

2. Which of the following options does not represent ground state electronic configuration of an atom?

(i) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$

(ii) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$

(iii) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$

(iv) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

Or

Total number of orbitals associated with third shell will be \_\_\_\_.

(i)2

(ii)4

(iii)9

(iv)3

3. Which of the following is not an actinoid?

(i)Curium (Z = 96)

(ii)Californium (Z = 98)

(iii)Uranium (Z = 92)

(iv)Terbium (Z = 65)

OR

The elements with atomic numbers 35, 53 and 85 are all \_\_\_\_\_.

(i)noble gases

(ii)halogens

(iii)heavy metals

(iv)light metals

4 . 16 g of oxygen has same number of molecules as in

(i)16 g of CO

(ii)28 g of N<sub>2</sub>

(iii)14 g of N<sub>2</sub>

(iv)1.0 g of H<sub>2</sub>

5. In which of the following pairs, the ions are iso-electronic?

(i)Na<sup>+</sup>, Mg<sup>2+</sup>

(ii)Al<sub>3</sub><sup>+</sup>, O<sup>-</sup>

(iii)Na<sup>+</sup>, O<sub>2</sub><sup>-</sup>

(iv)N<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>

6. Which of the following elements can show covalency greater than 4?

(i)Be

(ii)P

(iii)S

(iv)B

7. Relationship between Molecular mass and Vapour density, Molecular mass=\_\_\_\_\_

8. Number of angular nodes for 4d orbital is \_\_\_\_\_

9. Number of Significant figures in 208 is 4.

10.The number of radial nodes for 3p orbital is 1.

11. Match the following

Column 1

Column 2

(i) Photon

(a) Value is 4 for N shell

(ii) Electron

(b) Probability density

(iii)  $\psi^2$

(c) Always positive value

(iv) Principal quantum number n

(d) Exhibits both momentum and wavelength

12. Match the correct atomic radius with the element.

Column 1

Column 2

Element

Atomic radius (pm)

Be

74

C

88

O

111

B

77

N

66

13. Assertion (A) : One atomic mass unit is defined as one twelfth of the mass of one carbon-12 atom.

Reason (R) : Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.

(i) Both A and R are true and R is the correct explanation of A.

(ii) Both A and R are true but R is not the correct explanation of A.

(iii) A is true but R is false.

(iv) Both A and R are false.

Or

38. Assertion (A) : The empirical mass of ethene is half of its molecular mass.

Reason (R) : The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

(i) Both A and R are true and R is the correct explanation of A.

(ii) A is true but R is false.

(iii) A is false but R is true.

(iv) Both A and R are false.

14. In the following questions a statement of Assertion (A) followed by a statement of reason (R) is given. Choose the correct option out of the choices given below each question.

Assertion (A) : Generally, ionisation enthalpy increases from left to right in a period.

Reason (R) : When successive electrons are added to the orbitals in the same principal quantum level, the shielding effect of inner core of electrons does not increase very much to compensate for the increased attraction of the electron to the nucleus.

(i) Assertion is correct statement and reason is wrong statement.

(ii) Assertion and reason both are correct statements and reason is correct explanation of assertion.

(iii) Assertion and reason both are wrong statements.

(iv) Assertion is wrong statement and reason is correct statement.

15. Calculate the number of molecules and number of atoms present in 11.2 litres of oxygen of oxygen ( $O_2$ ) at N.T.P.

OR

Calculate the mass percent of different elements in sodium sulphate, ( $Na_2SO_4$ ).

16. How many moles and how many grams of sodium chloride are present in 250 mL of a 0.50 M NaCl solution?

17. Define (1) Precision (2) Accuracy.

18. An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the atomic symbol to the element.

OR

Calculate the mass of a photon with wavelength  $3.6 \text{ \AA}$ .

19. State Heisenberg's uncertainty principle. Give its mathematical expression?

20. Arrange the following ions in order of increasing ionic radius:  $K^+$ ,  $P^{3-}$ ,  $S^{2-}$ ,  $Cl^-$ . Give reason.

21. Generally electron gain enthalpy becomes less negative as we move down the group.

However electron gain enthalpy of O & F is less than that of succeeding elements (i.e. S and Cl) in their respective group. Explain.

22. Write the empirical formulae of the following:

(1)  $N_2O_4$  (2)  $C_6H_6$  (3)  $C_6H_{12}O_6$  (4)  $H_2O_2$  (5)  $CH_3COOH$  (6)  $Na_2CO_3$

or

How many significant figures are present in the following?

(i) 0.0025

(ii) 208

(iii) 5005

(iv) 126,000

(v) 500.0

(vi) 2.0034

23. Calculate the concentration of nitric acid in moles per litre in a sample which has a density,  $1.41 \text{ g mL}^{-1}$  and the mass per cent of nitric acid in it being 69%.

24. Determine the molecular formula of an oxide of iron in which the mass per cent of iron and oxygen are 69.9 and 30.1 respectively. Given that the molar mass of the oxide is  $159.8 \text{ gmol}^{-1}$  (Atomic mass: Fe = 55.85 amu, O = 16.00 amu)

25. Explain Planck's Quantum Theory?

or

What are the frequency and wavelength of a photon emitted during a transition from  $n = 5$  state to the  $n = 2$  state in the hydrogen atom?

26. State and explain "aufbau principle"

27. Write electronic configurations of atoms of Cr (atomic number=24) and Cu (atomic number=29). Show the orientations of electron spins by arrow heads

Or

Write three weakness of Bohr's model of atom.

28. What are transition elements? Why are they so called? Name the different transition series.

29. Define the following terms:

(1) Ionization enthalpy (2) Electron gain enthalpy (3) Electronegativity

30. Explain variation of atomic radii in a group and in a period.

Or

Write the general electronic configuration of s, p and d-block elements

- 31  $\text{HCl (aq)} + \text{MnO}_2(\text{s}) \rightarrow 2\text{H}_2\text{O (l)} + \text{MnCl}_2(\text{aq}) + \text{Cl}_2(\text{g})$  How many grams of HCl react with 5.0 g of manganese dioxide? (2)
- (ii) A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.690 g of water and no other products. A volume of 10.0 L (measured at STP) of this welding gas is found to weigh 11.6 g. Calculate (3)
- (a) empirical formula  
(b) molar mass of the gas, and  
(c) molecular formula

Or

- (i) Calcium carbonate reacts with aqueous HCl to give  $\text{CaCl}_2$  and  $\text{CO}_2$  according to the reaction, (3)  
 $\text{CaCO}_3(\text{s}) + 2\text{HCl (aq)} \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O (l)}$ . What mass of  $\text{CaCO}_3$  is required to react completely with 25 mL of 0.75 M HCl?
- (ii) Calculate the molarity of a solution of ethanol in water in which the mole fraction of ethanol is 0.040 (assume the density of water to be one). (2)

32. (i) what is Photoelectric effect? (2)

(ii) When electromagnetic radiation of wavelength 300 nm falls on the surface of sodium, electrons are emitted with a kinetic energy of  $1.68 \times 10^5 \text{ J mol}^{-1}$ . What is the minimum energy needed to remove an electron from sodium? What is the maximum wavelength that will cause a photoelectron to be emitted? (3)

Or

(i) Define the following terms:-

- (a) Pauli's exclusion principle  
(b) Hund's rule of maximum multiplicity (2)

(ii) Define Quantum numbers. Name them. (3)

33. (a) Write four characteristic properties of p-block elements. (2)  
(b) Explain the variation of Ionisation enthalpy along a period and along a group. (3)

Or

- (a) Write four characteristic properties of d-block elements. (2)  
(b) Explain the variation of Electronegativity along a period and along a group. (3)

