

CAREER BLITZ

A Responsible Education Management Company

Subject: Chemistry

Class: XI

HW: 01

Date: 20-06-2015

Course: IGNITE

1. Some basic concept of chemistry

Multiple Choice Questions (Type-I)

1. Two students performed the same experiment separately and each one of them recorded two readings of mass which are given below. Correct reading of mass is 3.0 g. On the basis of given data, mark the correct option out of the following statements.

Student	Readings	
	(i)	(ii)
A	3.01	2.99
B	3.05	2.95

- (i) Results of both the students are neither accurate nor precise.
(ii) Results of student A are both precise and accurate.
(iii) Results of student B are neither precise nor accurate.
(iv) Results of student B are both precise and accurate.
2. A measured temperature on Fahrenheit scale is 200 °F. What will this reading be on Celsius scale?
(i) 40 °C (ii) 94 °C (iii) 93.3 °C (iv) 30 °C
3. What will be the molarity of a solution, which contains 5.85 g of NaCl(s) per 500 mL?
(i) 4 mol/ L (ii) 20 mol/ L (iii) 0.2 mol/ L (iv) 2 mol/ L
4. 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
5. The number of atoms present in one mole of an element is equal to Avogadro number. Which of the following element contains the greatest number of atoms?
(i) 4g He (ii) 46g Na (iii) 0.40g Ca (iv) 12g He
6. If the concentration of glucose ($C_6H_{12}O_6$) in blood is 0.9 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
7. What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water?
(i) 0.1 m (ii) 1 M (iii) 0.5 m (iv) 1 m
8. One mole of any substance contains 6.022×10^{23} atoms/molecules. Number of molecules of H_2SO_4 present in 100 mL of 0.02M H_2SO_4 solution is _____.
(i) 12.044×10^{20} molecules (ii) 6.022×10^{23} molecules
(iii) 1×10^{23} molecules (iv) 12.044×10^{23} molecules
9. What is the mass percent of carbon in carbon dioxide?
(i) 0.034% (ii) 27.27% (iii) 3.4% (iv) 28.7%

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10. The empirical formula and molecular mass of a compound are CH_2O and 180 g respectively. What will be the molecular formula of the compound?
(i) $\text{C}_9\text{H}_{18}\text{O}_9$ (ii) CH_2O (iii) $\text{C}_6\text{H}_{12}\text{O}_6$ (iv) $\text{C}_2\text{H}_4\text{O}_2$
11. If the density of a solution is 3.12 g mL^{-1} , the mass of 1.5 mL solution in significant figures is _____.
(i) 4.7g (ii) $4680 \times 10^{-3}\text{g}$ (iii) 4.680g (iv) 46.80g
12. Which of the following statements about a compound is incorrect?
(i) A molecule of a compound has atoms of different elements.
(ii) A compound cannot be separated into its constituent elements by physical methods of separation.
(iii) A compound retains the physical properties of its constituent elements.
(iv) The ratio of atoms of different elements in a compound is fixed.
13. Which of the following statements is correct about the reaction given below:
 $4\text{Fe(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{Fe}_2\text{O}_3\text{(g)}$
(i) Total mass of iron and oxygen in reactants = total mass of iron and oxygen in product therefore it follows law of conservation of mass.
(ii) Total mass of reactants = total mass of product; therefore, law of multiple proportions is followed.
(iii) Amount of Fe_2O_3 can be increased by taking any one of the reactants (iron or oxygen) in excess.
(iv) Amount of Fe_2O_3 produced will decrease if the amount of any one of the reactants (iron or oxygen) is taken in excess.
14. Which of the following reactions is not correct according to the law of conservation of mass?
(i) $2\text{Mg(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{MgO(s)}$ (ii) $\text{C}_3\text{H}_8\text{(g)} + \text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + \text{H}_2\text{O(g)}$
(iii) $\text{P}_4\text{(s)} + 5\text{O}_2\text{(g)} \rightarrow \text{P}_4\text{O}_{10}\text{(s)}$ (iv) $\text{CH}_4\text{(g)} + 2\text{O}_2\text{(g)} \rightarrow \text{CO}_2\text{(g)} + 2\text{H}_2\text{O(g)}$
15. Which of the following statements indicates that law of multiple proportion is being followed.
(i) Sample of carbon dioxide taken from any source will always have carbon and oxygen in the ratio 1:2.
(ii) Carbon forms two oxides namely CO_2 and CO , where masses of oxygen which combine with fixed mass of carbon are in the simple ratio 2:1.
(iii) When magnesium burns in oxygen, the amount of magnesium taken for the reaction is equal to the amount of magnesium in magnesium oxide formed.
(iv) At constant temperature and pressure 200 mL of hydrogen will combine with 100 mL oxygen to produce 200 mL of water vapour.

Multiple Choice Questions (Type-II)

In the following questions more than one options may be correct.

16. One mole of oxygen gas at STP is equal to _____.
(i) 6.022×10^{23} molecules of oxygen (ii) 6.022×10^{23} atoms of oxygen
(iii) 16 g of oxygen (iv) 32 g of oxygen
17. Sulphuric acid reacts with sodium hydroxide as follows :
 $\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
When 1L of 0.1M sulphuric acid solution is allowed to react with 1L of 0.1M sodium hydroxide solution, the amount of sodium sulphate formed and its molarity in the solution obtained is
(i) 0.1 mol L^{-1} (ii) 7.10 g (iii) 0.025 mol L^{-1} (iv) 3.55 g

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18. Which of the following pairs have the same number of atoms?
(i) 16 g of O₂(g) and 4 g of H₂(g) (ii) 16 g of O₂ and 44 g of CO₂
(iii) 28 g of N₂ and 32 g of O₂ (iv) 12 g of C(s) and 23 g of Na(s)
19. Which of the following solutions have the same concentration?
(i) 20 g of NaOH in 200 mL of solution (ii) 0.5 mol of KCl in 200 mL of solution
(iii) 40 g of NaOH in 100 mL of solution (iv) 20 g of KOH in 200 mL of solution
20. 16 g of oxygen has same number of molecules as in
(i) 16 g of CO (ii) 28 g of N₂ (iii) 14 g of N₂ (iv) 1.0 g of H₂
21. Which of the following terms are unitless?
(i) Molality (ii) Molarity (iii) Mole fraction (iv) Mass percent
22. One of the statements of Dalton's atomic theory is given below:
"Compounds are formed when atoms of different elements combine in a fixed ratio" Which of the following laws is not related to this statement?
(i) Law of conservation of mass (ii) Law of definite proportions
(iii) Law of multiple proportions (iv) Avogadro law

III. Short Answer Type

23. What will be the mass of one atom of C-12 in grams?
24. What is the difference between molality and molarity?(1.99×10^{-23} g)
25. Calculate the mass percent of calcium, phosphorus and oxygen in calcium phosphate Ca₃(PO₄)₂.
(38.71%, 20%, 41.29%)
26. 45.4 L of dinitrogen reacted with 22.7 L of dioxygen and 45.4 L of nitrous oxide was formed. The reaction is given below:
$$2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{N}_2\text{O}(\text{g})$$

Which law is being obeyed in this experiment? Write the statement of the law?
27. If two elements can combine to form more than one compound, the masses of one element that combine with a fixed mass of the other element, are in whole number ratio.
(a) Is this statement true?
(b) If yes, according to which law?
(c) Give one example related to this law.
28. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc. Following reaction takes place.
$$\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$$

Calculate the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl. 1 mol of a gas occupies 22.7 L volume at STP; atomic mass of Zn = 65.3 u (11.35 L)

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29. The density of 3 molal solution of NaOH is 1.110 g mL^{-1} . Calculate the molarity of the solution?(2.97 M)
30. Volume of a solution changes with change in temperature, then, will the molality of the solution be affected by temperature? Give reason for your answer

Chapter 2 . Structure of Atom

I. Multiple Choice Questions (Type-I)

1. Which of the following conclusions could not be derived from Rutherford's α -particle scattering experiment?
(i) Most of the space in the atom is empty.
(ii) The radius of the atom is about 10^{-10} m while that of nucleus is 10^{-15} m .
(iii) Electrons move in a circular path of fixed energy called orbits.
(iv) Electrons and the nucleus are held together by electrostatic forces of attraction
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) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$
3. Which of the following statement is not correct about the characteristics of cathode rays?
(i) They start from the cathode and move towards the anode.
(ii) They travel in straight line in the absence of an external electrical or magnetic field.
(iii) Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube.
(iv) Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube.
4. Which of the following statements about the electron is incorrect?
(i) It is a negatively charged particle. (ii) The mass of electron is equal to the mass of neutron.
(iii) It is a basic constituent of all atoms. (iv) It is a constituent of cathode rays.
5. Which of the following properties of atom could be explained correctly by Thomson Model of atom?
(i) Overall neutrality of atom. (ii) Spectra of hydrogen atom.
(iii) Position of electrons, protons and neutrons in atom. (iv) Stability of atom.
6. The number of radial nodes for $3p$ orbital is _____.
(i) 3 (ii) 4 (iii) 2 (iv) 1
7. Two atoms are said to be isobars if.
(i) they have same atomic number but different mass number.
(ii) they have same number of electrons but different number of neutrons.
(iii) they have same number of neutrons but different number of electrons.
(iv) sum of the number of protons and neutrons is same but the number of protons is different
8. Number of angular nodes for $4d$ orbital is _____.
(i) 4 (ii) 3 (iii) 2 (iv) 1
9. Which of the following is responsible to rule out the existence of definite paths or trajectories of electrons?
(i) Pauli's exclusion principle. (ii) Heisenberg's uncertainty principle.
(iii) Hund's rule of maximum multiplicity. (iv) Aufbau principle.

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10. Total number of orbitals associated with third shell will be _____.
(i) 2 (ii) 4 (iii) 9 (iv) 3
11. Orbital angular momentum depends on _____.
(i) l (ii) n and l (iii) n and m (iv) m and s
12. Chlorine exists in two isotopic forms, Cl-37 and Cl-35 but its atomic mass is 35.5. This indicates the ratio of Cl-37 and Cl-35 is approximately
(i) 1:2 (ii) 1:1 (iii) 1:3 (iv) 3:1
13. The pair of ions having same electronic configuration is _____.
(i) Cr^{3+} , Fe^{3+} (ii) Fe^{3+} , Mn^{2+} (iii) Fe^{3+} , Co^{3+} (iv) Sc^{3+} , Cr^{3+}
14. For the electrons of oxygen atom, which of the following statements is correct?
(i) Z_{eff} for an electron in a 2s orbital is the same as Z_{eff} for an electron in a 2p orbital.
(ii) An electron in the 2s orbital has the same energy as an electron in the 2p orbital.
(iii) Z_{eff} for an electron in 1s orbital is the same as Z_{eff} for an electron in a 2s orbital.
(iv) The two electrons present in the 2s orbital have spin quantum numbers m_s but of opposite sign.
15. If travelling at same speeds, which of the following matter waves have the shortest wavelength?
(i) Electron (ii) Alpha particle (He^{2+}) (iii) Neutron (iv) Proton

II. Multiple Choice Questions (Type-II)

In the following questions two or more options may be correct.

16. Identify the pairs which are **not** of isotopes?
(i) ${}_6\text{X}^{12}$, ${}_6\text{Y}^{13}$ (ii) ${}_{17}\text{X}^{35}$, ${}_{17}\text{Y}^{37}$ (iii) ${}_6\text{X}^{14}$, ${}_7\text{Y}^{14}$ (iv) ${}_4\text{X}^8$, ${}_5\text{Y}^8$
17. Out of the following pairs of electrons, identify the pairs of electrons present in degenerate orbitals :
(i) (a) $n = 3, l = 2, m = -2, s = -\frac{1}{2}$ (b) $n = 3, l = 2, m = -1, s = -\frac{1}{2}$
(ii) (a) $n = 3, l = 1, m = 1, s = +\frac{1}{2}$ (b) $n = 3, l = 2, m = 1, s = +\frac{1}{2}$
(iii) (a) $n = 4, l = 1, m = 1, s = +\frac{1}{2}$ (b) $n = 3, l = 2, m = 1, s = +\frac{1}{2}$
(iv) (a) $n = 3, l = 2, m = +2, s = -\frac{1}{2}$ (b) $n = 3, l = 2, m = +2, s = +\frac{1}{2}$
18. Which of the following sets of quantum numbers are correct?
- | | n | l | m |
|-------|-----|-----|-----|
| (i) | 1 | 1 | +2 |
| (ii) | 2 | 1 | +1 |
| (iii) | 3 | 2 | -2 |
| (iv) | 3 | 4 | -2 |
19. In which of the following pairs, the ions are iso-electronic?
(i) Na^+ , Mg^{2+} (ii) Al^{3+} , O^-
(iii) Na^+ , O^{2-} (iv) N^{3-} , Cl^-

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20. Which of the following statements concerning the quantum numbers are correct?
- (i) Angular quantum number determines the three dimensional shape of the orbital.
 - (ii) The principal quantum number determines the orientation and energy of the orbital.
 - (iii) Magnetic quantum number determines the size of the orbital.
 - (iv) Spin quantum number of an electron determines the orientation of the spin of electron relative to the chosen axis.

III. Short Answer Type

21. Arrange s , p and d sub-shells of a shell in the increasing order of effective nuclear charge (Z_{eff}) experienced by the electron present in them.
22. Show the distribution of electrons in oxygen atom (atomic number 8) using orbital diagram.
23. Nickel atom can lose two electrons to form Ni^{2+} ion. The atomic number of nickel is 28. From which orbital will nickel lose two electrons.
24. Which of the following orbitals are degenerate?
 $3d_{xy}$, $4d_{xy}$, $3d_{yz}$, $4d_{yz}$, $3d_{z^2}$, $4d_{z^2}$
25. Calculate the total number of angular nodes and radial nodes present in $3p$ orbital.
26. Which of the following will not show deflection from the path on passing through an electric field?
Proton, cathode rays, electron, neutron.
27. An atom having atomic mass number 13 has 7 neutrons. What is the atomic number of the atom?
28. Wavelengths of different radiations are given below :
 $\lambda(\text{A}) = 300 \text{ nm}$ $\lambda(\text{B}) = 300 \mu\text{m}$ $\lambda(\text{C}) = 3 \text{ nm}$ $\lambda(\text{D}) = 30 \text{ \AA}$
Arrange these radiations in the increasing order of their energies.
29. The electronic configuration of valence shell of Cu is $3d^{10}4s^1$ and not $3d^94s^2$. How is this configuration explained?
30. The Balmer series in the hydrogen spectrum corresponds to the transition from $n_1 = 2$ to $n_2 = 3, 4, \dots$. This series lies in the visible region. Calculate the wave number of line associated with the transition in Balmer series when the electron moves to $n = 4$ orbit. ($R_H = 109677 \text{ cm}^{-1}$)

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ANSWERS (chap-1)

I. Multiple Choice Questions (Type-I)

1. (ii) 2. (iii) 3. (iii) 4. (ii) 5. (iv) 6. (iii) 7. (iv) 8. (i) 9. (ii) 10. (iii) 11. (i) 12. (iii) 13. (i) 14. (ii) 15. (ii)

II. Multiple Choice Questions (Type-II)

16. (i), (iv) 17. (ii), (iii) 18. (iii), (iv) 19. (i), (ii) 20. (iii), (iv) 21. (iii), (iv) 22. (i), (iv)

ANSWERS(chap-2)

I. Multiple Choice Questions (Type-I)

1. (iii) 2. (ii) 3. (iv) 4. (ii) 5. (i) 6. (iv) 7. (iv) 8. (iii) 9. (ii) 10. (iii) 11. (i) 12. (iii) 13. (ii) 14. (iv) 15. (ii)

II. Multiple Choice Questions (Type-II)

16. (iii), (iv) 17. (i), (iv) 18. (ii), (iii) 19. (i), (iii) 20. (i), (iv)