



**RAVI MATHS TUITION CENTRE , WHATSAPP - 8056206308**

Time : 200 Mins

CHEMISTRY TEST 1 1

Marks : 800

1. Number of moles of  $\text{MnO}_4^-$  required to oxidize one mole of ferrous oxalate completely in acidic medium will be:  
a) 0.6 moles b) 0.4 moles c) 7.5 moles d) 0.2 moles
2. Total number of atoms present in 34 g of  $\text{NH}_3$  is  
a)  $4 \times 10^{23}$  b)  $4.8 \times 10^{21}$  c)  $2 \times 10^{23}$  d)  $48 \times 10^{23}$
3. Which of the following statements about a compound is incorrect?  
a) A molecule of a compound has atoms of different elements  
b) A compound cannot be separated into its constituent elements by physical methods of separation.  
c) A compound retains the physical properties of its constituent elements.  
d) The ratio of atoms of different elements in a compound is fixed.
4. Which set of figures will be obtained after rounding up the following up to three significant figures?  
34.216, 0.04597, 10.4107  
a) 34.3, 0.0461, 10.4 b) 34.2, 0.0460, 10.4 c) 34.20, 0.460, 10.40 d) 34.21, 4.597, 1.04
5. In which case is the number of molecules of water maximum?  
a) 18 mL of water b) 0.18 g of water c) 0.00224 L of water vapours at 1 atm and 273 K  
d)  $10^{-3}$  mol of water
6. What volume of water is to be added to 100  $\text{cm}^3$  of 0.5 M NaOH solution to make it 0.1 M solution?  
a) 200  $\text{cm}^3$  b) 400  $\text{cm}^3$  c) 500  $\text{cm}^3$  d) 100  $\text{cm}^3$
7. Iron can be obtained by reduction of iron oxide ( $\text{Fe}_3\text{O}_4$ ) with CO according to the reaction;  
 $\text{Fe}_3\text{O}_4 + 4\text{CO} \rightarrow 3\text{Fe} + 4\text{CO}_2$   
How many kg of  $\text{Fe}_3\text{O}_4$  should be heated with CO to get 3 kg of iron?  
a) 8.12 kg b) 4.14 kg c) 6.94 kg d) 16.8 kg
8. Choose 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 and its molecular mass is 160.  
a) FeO b)  $\text{Fe}_3\text{O}_4$  c)  $\text{Fe}_2\text{O}_3$  d)  $\text{FeO}_2$
9. Hydrogen gas is prepared in the laboratory by reacting dilute HCl with granulated zinc. Following reaction takes place:  
 $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$   
What would be the volume of hydrogen gas liberated at STP when 32.65 g of zinc reacts with HCl?  
a) 10.03 L b) 11.35 L c) 11.57 L d) 9.53 L
10. Which of the following is the most accurate measurement?  
a) 9 m b) 9.0 m c) 9.00 m d) 9.000 m
11. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200 g. The number of iron atoms (at. weight of Fe is 56) present in one molecule of haemoglobin are:  
a) 1 b) 6 c) 4 d) 2
12. 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)

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Student	Readings	
A	3.01	2.99
B	3.05	2.95

- a) Results of both the students are neither accurate nor precise.  
 b) Results of student A are both precise and accurate.  
 c) Results of student B are neither precise nor accurate.  
 d) Results of student B are both precise and accurate.
13. What is the total number of electrons present in 1.6 g of methane?  
 a)  $6.023 \times 10^{23}$  b) 16 c)  $12.04 \times 10^{23}$  d)  $6.023 \times 10^{24}$
14. What mass of sodium chloride would be decomposed by 9.8 g of sulphuric acid if 12 g of sodium bisulphate and 2.75 g of hydrogen chloride were produced in a reaction?  
 a) 14.75 g b) 3.8 g c) 4.95 g d) 2.2 g
15. In a mixture of gases, the volume content of a gas is 0.06% at STP. Calculate the number of molecules of the gas in 1 L of the mixture.  
 a)  $1.613 \times 10^{23}$  b)  $6.023 \times 10^{23}$  c)  $1.61 \times 10^{27}$  d)  $1.61 \times 10^{19}$
16. What volume of oxygen gas ( $O_2$ ) measured at  $0^\circ C$  and 1 atm, is needed to burn completely 1L of propane gas., ( $C_3H_8$ ) measured under the same conditions  
 a) 7 L b) 6 L c) 5 L d) 10 L
17. 4.88 g of  $KClO_3$  when heated produced 1.92 g of  $O_2$  and 2.96 g of KCl. Which of the following statements regarding the experiment is correct?  
 a) The result illustrates the law of conservation of mass.  
 b) The result illustrates the law of multiple proportions. c) The result illustrates the law of constant proportion.  
 d) None of the above laws is followed.
18. Liquid benzene ( $C_6H_6$ ) burns in oxygen according to the equation,  $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(g)$   
 How many litres of  $O_2$  at STP are needed to complete the combustion of 39 g of liquid benzene? (Mol. weight of  $O_2 = 32$ ,  $C_6H_6 = 78$ )  
 a) 74 L b) 11.2 L c) 22.4 L d) 84 L
19. Given below are few statements. Mark the statement which is not correct.  
 a) Atoms are neither created nor destroyed in a chemical reaction  
 b) Law of definite proportion states that a given compound always contains exactly the same proportion of elements by weight  
 c) Gay Lussac's law of chemical combination is valid for all substances.  
 d) A pure compound has always a fixed proportion of masses of its constituents.
20. Which of the following pairs illustrates the law of multiple proportions?  
 a)  $PH_3, HCl$  b)  $PbO, PbO_2$  c)  $H_2S, SO_2$  d)  $CuCl_2, CuSO_4$
21. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample? (At. Wt. Mg = 24)  
 a) 75 b) 96 c) 60 d) 84
22. How much oxygen is required for complete combustion of 560 g of ethene?  
 a) 6.4 kg b) 1.92 kg c) 2.8 kg d) 9.6 kg
23. Liquid benzene ( $C_6H_6$ ) burns in oxygen according to the equation,  $2C_6H_6(l) + 15O_2(g) \rightarrow 12CO_2(g) + 6H_2O(g)$   
 How many litres of  $O_2$  at STP are needed to complete the combustion of 39 g of liquid benzene? (Mol. weight of  $O_2 = 32, C_6H_6 = 78$ )  
 a) 74 L b) 11.2 L c) 22.4 L d) 84 L
24. The reference standard used for defining atomic mass is  
 a) H - 1 b) C - 12 c) C - 13 d) C - 14
25. How many grams of CaO are required to react with 852 g of  $P_4O_{10}$ ?  
 a) 852 g b) 1008 g c) 85 g d) 7095 g

26. Which has the maximum number of molecules among the following?  
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- a) 44 g CO<sub>2</sub> b) 48 g O<sub>3</sub> c) 8gH<sub>2</sub> d) 64gSO<sub>2</sub>

27. Which of the following statements best explains the law of conservation of mass?

- a) 100 g of water is heated to give steam  
 b) A sample of N<sub>2</sub> gas is heated at constant pressure without any change in mass.  
 c) 36 g of carbon combines with 32 g of oxygen to form 68 g of CO<sub>2</sub>  
 d) 10 g of carbon is heated in vacuum without any change in mass

28. One mole of any substance contains  $6.022 \times 10^{23}$  atoms/molecules. Number of molecules of H<sub>2</sub>SO<sub>4</sub> present in 100 mL of 0.02 M H<sub>2</sub>SO<sub>4</sub> solution is \_\_\_\_\_ molecules.

- a)  $12.044 \times 10^{20}$  b)  $6.022 \times 10^{23}$  c)  $1 \times 10^{23}$  d)  $12.044 \times 10^{23}$

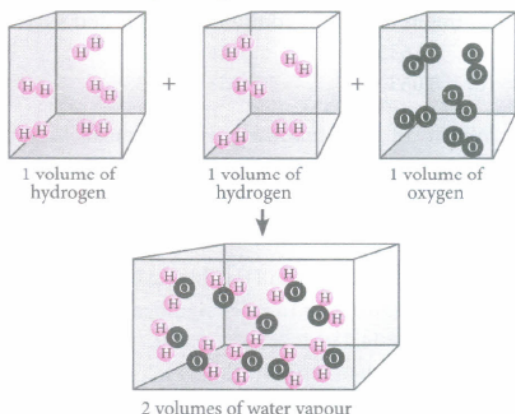
29. A mixture having 2 g of hydrogen and 32 g of oxygen occupies how much volume at NTP?

- a) 44.8 L b) 22.4 L c) 11.2 L d) 67.2 L

30. In a reaction container, 100 g of hydrogen and 100 g of Cl<sub>2</sub> are mixed for the formation of HCl gas. What is the limiting reagent and how much HCl is formed in the reaction?

- a) H<sub>2</sub> is limiting reagent and 36.5 g of HCl are formed.  
 b) Cl<sub>2</sub> is limiting reagent and 104.28 g of HCl are formed.  
 c) H<sub>2</sub> is limiting reagent and 142 g of HCl are formed. d) Cl<sub>2</sub> is limiting reagent and 73 g of HCl are formed.

31. Which of the following law of chemical combination is satisfied by the figure?



- a) Law of multiple proportion b) Dalton's law c) Avogadro law d) Law of conservation of mass

32. How many significant figures are present in  $0.010100 \times 10^{-3}$ ?

- a) 7 b) 5 c) 3 d) 10

33. 0.48 g of a sample of a compound containing boron and oxygen contains 0.192 g of boron and 0.288 g of oxygen. What will be the percentage composition of the compound?

- a) 60% and 40% B and O respectively b) 40% and 60% B and O respectively  
 c) 30% and 70% B and O respectively d) 70% and 30% B and O respectively

34. How many number of molecules and atoms respectively are present in 2.8 litres of a diatomic gas at STP?

- a)  $15 \times 10^{22}$ ,  $7.5 \times 10^{23}$  b)  $6.023 \times 10^{23}$ ,  $7.5 \times 10^{23}$  c)  $6.023 \times 10^{23}$ ,  $15 \times 10^{22}$  d)  $7.5 \times 10^{22}$ ,  $15 \times 10^{22}$

35. What is the weight of oxygen required for the complete combustion of 2.8 kg of ethylene?

- a) 2.8 kg b) 6.4 kg c) 9.6 kg d) 96 kg

36. **Assertion** : Molecular formula shows the exact number of different types of atoms present in a molecule of a compound.

**Reason**: Molecular formula can be obtained directly from empirical formula which represents the simplest whole number ratio of various atoms present in a compound.

- a) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion  
 b) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion  
 c) Assertion is correct but Reason is incorrect d) Both Assertion and Reason are incorrect

37. The empirical formula of a compound is CH<sub>2</sub>O<sub>2</sub> What could be its molecular formula?

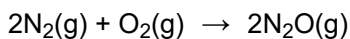
- a) C<sub>2</sub>H<sub>2</sub>O<sub>2</sub> b) C<sub>2</sub>H<sub>2</sub>O<sub>4</sub> c) C<sub>2</sub>H<sub>4</sub>O<sub>4</sub> d) CH<sub>4</sub>O<sub>4</sub>

38. The number of moles of KMnO<sub>4</sub> reduced by 1 mol of K<sub>2</sub> in alkaline medium is. [padasalai.net@gmail.com](mailto:padasalai.net@gmail.com)

- a) 1/5 b) 2 c) 3/2 d) 4

39. If the density of a solution is  $3.12 \text{ g mL}^{-1}$ , the mass of 1.5 mL solution in significant figures is \_\_\_\_\_.
- a) 4.7 g b)  $4680 \times 10^{-3} \text{ g}$  c) 4.680 g d) 46.80 g
40. 4.28 g of NaOH is dissolved in water and the solution is made to 250 cc. What will be the molarity of the solution?
- a)  $0.615 \text{ mol L}^{-1}$  b)  $0.428 \text{ mol L}^{-1}$  c)  $0.301 \text{ mol L}^{-1}$  d)  $0.99 \text{ mol L}^{-1}$

41. 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:



Which law is being obeyed in this experiment?

- a) Gay Lussac's law b) Law of definite proportion c) Law of multiple proportion d) Avogadro's law
42. The following data are obtained when dinitrogen and dioxygen react together to form different compounds:

Mass of dinitrogen	Mass of dioxygen
14 g	16 g
14 g	32 g
28 g	32 g
28 g	96 g

Which law of chemical combination is obeyed by the above experimental data?

- a) Law of conservation of mass b) Law of definite proportions c) Law of multiple proportions  
d) Avogadro's Law
43. What mass of hydrochloric acid is needed to decompose 50 g of limestone?
- a) 36.5g b) 73 g c) 50 g d) 100 g
44. Few figures are expressed in scientific notation. Mark the incorrect one.
- a)  $234000 = 2.34 \times 10^5$  b)  $8008 = 8 \times 10^3$  c)  $0.0048 = 4.8 \times 10^{-3}$  d)  $500.0 = 5.00 \times 10^2$
45. Concentrated aqueous sulphuric acid is 98%  $\text{H}_2\text{SO}_4$  by mass and has a density of  $1.80 \text{ g mL}^{-1}$ . Volume of acid required to make one litre of 0.1 M  $\text{H}_2\text{SO}_4$  solution is
- a) 16.65 mL b) 22.20 mL c) 5.55 mL d) 11.10 mL

46. **Assertion:** The reactant which is present in larger amount limits the amount of product formed is called limiting reagent.

**Reason :** Amount of product formed does not depend upon the amount of reactants taken.

- a) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion  
b) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion  
c) Assertion is correct but Reason is incorrect d) Both Assertion and Reason are incorrect
47. The number of significant figures for the three numbers 161 cm, 0.161 cm, 0.0161 cm are:
- a) 3, 4 and 5 respectively b) 3, 4 and 4 respectively c) 3, 3 and 4 respectively d) 3, 3, and 3 respectively
48. When 22.4 L of  $\text{H}_2$  (g) is mixed with 11.2 L of  $\text{Cl}_2$  (g), each at STP, the moles of HCl (g) formed is equal to:
- a) 1 mole of HCl (g) b) 2 moles of HCl (g) c) 0.5 mole of HCl (g) d) 1.5 moles of HCl (g)

49. How many seconds are there in 3 days?
- a) 259200 s b) 172800 s c) 24800 s d) 72000 s
50. An impure sample of silver (1.5 g) is heated with S to form 0.124 g of  $\text{Ag}_2\text{S}$ . What was the per cent yield of  $\text{Ag}_2\text{S}$ ?
- a) 21.6% b) 7.2% c) 1.7% d) 24.8%

51. In Haber's process 30 L of dihydrogen and 30 L of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end?
- a) 20L ammonia, 10L nitrogen, 30L hydrogen b) 20 L ammonia, 25 L nitrogen, 15L hydrogen  
c) 20 L ammonia, 20 L nitrogen, 20 L hydrogen d) 10L ammonia, 25 L nitrogen, 15L hydrogen

52. **Assertion:** Scientific notation for the number 100 is expressed as  $1 \times 10^2$ .

**Reason:** The number  $1 \times 10^2$  has two significant figures

- a) If both assertion and reason are true and reason is the correct explanation of assertion.  
b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
c) If assertion is true but reason is false d) If both assertion and reason are false.

53. Which of the following statements is correct about the reaction given below?  $4\text{Fe(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{Fe}_2\text{O}_3\text{(g)}$
- The total mass of reactants = Total mass of the products. It follows the law of conservation of mass.
  - Total mass of reactants = total mass of product; therefore, law of multiple proportions is followed.
  - Amount of  $\text{Fe}_2\text{O}_3$  can be increased by taking anyone of the reactants (iron or oxygen) in excess.
  - Amount of  $\text{Fe}_2\text{O}_3$  produced will decrease if the amount of anyone of the reactants (iron or oxygen) is taken in excess.
54. Which of the following rules regarding the significant figures and calculations involving them is not correct?
- The result of multiplication or division should be rounded off to same number of significant figures as present in least precise figure.
  - The non-significant figures in the measurements are rounded off.
  - The result of an addition or subtraction is reported to the same number of decimal places as present in number with least decimal places
  - Result of multiplication or division should have same number of Significant figures as present in most precise figure.
55. **Assertion:** Temperature below  $0^\circ\text{C}$  is possible in Celsius scale but on Kelvin scale, negative temperature is not possible.  
**Reason:** The Kelvin scale is related to Celsius scale as  $\text{K} = 0^\circ\text{C} + 273$
- Both assertion and reason are correct and reason is correct explanation for assertion.
  - Both assertion and reason are correct but reason is not correct explanation for assertion.
  - Assertion is correct but reason is incorrect.
  - Assertion is incorrect but reason is correct.
56. How many moles of oxygen gas can be produced during electrolytic decomposition of 180 g of water?
- 2.5 moles
  - 5 moles
  - 10 moles
  - 7 moles
57. In the final answer of the expression  $\frac{(29.2 - 20.2) (1.79 \times 10^5)}{1.37}$  The number of significant figures is :
- 1
  - 2
  - 3
  - 4
58. A metal oxide has the formula  $\text{Z}_2\text{O}_3$ . It can be reduced by hydrogen to give free metal and water. 0.1596 g of the metal oxide requires 6 mg of hydrogen for complete reduction. The atomic weight of the metal is
- 27.9
  - 159.6
  - 79.8
  - 55.8
59. What will be the mass of 100 atoms of hydrogen?
- 100 g
  - $1.66 \times 10^{-22}$  g
  - $6.023 \times 10^{23}$  g
  - $100 \times 6.023 \times 10^{23}$  g
60. Few quantities with their units are listed below. Mark the units which are not correctly matched.
- Density:  $\text{kg m}^{-3}$
  - Velocity of light:  $\text{m S}^{-1}$
  - Planck's constant :  $\text{J}^{-1} \text{S}^{-1}$
  - Acceleration:  $\text{m S}^{-2}$
  - Force:  $\text{kg m}$
- (ii) and (iv)
  - (i) and (iii)
  - (iii) and (v)
  - (iv) and (v)
61. Which of the following formulae is not correctly depicted?
- Molar mass =  $\frac{\text{Mass of substance}}{\text{moles of substance}}$
  - Mass of one molecule of a substance =  $\frac{\text{gram molecular mass of the substance}}{\text{Avogadro's number}}$
  - Number of molecules =  $\frac{\text{Mass of the substance}}{\text{Molar mass}} \times \text{Avogadro's no}$
  - Number of moles x molar mass = number of molecules
62. Which of the following gases will have least volume if 10 g of each gas is taken at same temperature and pressure?
- $\text{CO}_2$
  - $\text{N}_2$
  - $\text{CH}_4$
  - HCl
63. The maximum number of molecules is present in:

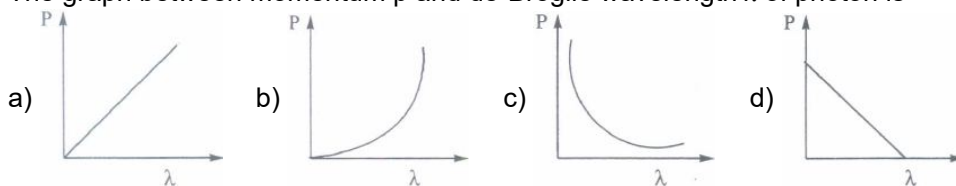
a) 15 L of H<sub>2</sub> gas at STP    b) 15 L of N<sub>2</sub> gas at STP    c) 0.5 g of H<sub>2</sub> gas    d) 10 g of O<sub>2</sub> gas

64. Assuming fully decomposed, the volume of CO<sub>2</sub>, released at STP on heating 9.85 g of BaCO<sub>3</sub> (Atomic mass, Ba = 137) will be  
a) 2.24 l    b) 4.96 l    c) 1.12 l    d) 0.84 l
65. An element, X has the following isotopic composition <sup>200</sup>X : 90%, <sup>199</sup>X: 8.0%, <sup>202</sup>X: 2.0%. The weighted average atomic mass of the naturally occurring element X is closest to :  
a) 201 amu    b) 202 amu    c) 199 amu    d) 200 amu
66. How many oxygen atoms will be present in 88 g of CO<sub>2</sub>?  
a) 24.08 × 10<sup>23</sup>    b) 6.023 × 10<sup>23</sup>    c) 44 × 10<sup>23</sup>    d) 22 × 10<sup>24</sup>
67. Mark the rule which is not correctly stated about the determination of significant figures.  
a) Zeros preceding to first non-zero digit are not significant.  
b) Zeros preceding to first non-zero digit are not significant.  
c) Zeros at the end or right of the number are significant if they are on the right side of decimal point.  
d) All non-zero digits are significant.
68. Number of atoms in 4.25 g of NH<sub>3</sub> is:  
a) 6.023 × 10<sup>23</sup>    b) 4 × 6.023 × 10<sup>23</sup>    c) 1.7 × 10<sup>24</sup>    d) 4.5 × 6.023 × 10<sup>23</sup>
69. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO<sub>3</sub>? The concentrated acid is 70% HNO<sub>3</sub>.  
a) 45.0 g conc. HNO<sub>3</sub>    b) 90.0 g conc. HNO<sub>3</sub>    c) 70.0 g conc. HNO<sub>3</sub>    d) 540 g conc. HNO<sub>3</sub>
70. For every one <sup>37</sup>Cl isotope there are three <sup>35</sup>Cl isotopes in a sample of chlorine. What will be the average atomic mass of chlorine?  
a) 35    b) 37    c) 35.5    d) 35.6
71. If 40 g of CaCO<sub>3</sub> is treated with 40 g of HCl, which of the reactants will act as limiting reagent?  
a) CaCO<sub>3</sub>    b) HCl    c) Both (a) and (b)    d) None of these
72. Molarity equation of a mixture of solutions of same substance is given by  
a) M<sub>1</sub> + V<sub>1</sub> × M<sub>2</sub> + V<sub>2</sub> × M<sub>3</sub> + V<sub>3</sub> + ... = M<sub>1</sub> + M<sub>2</sub> + M<sub>3</sub>    b) M<sub>1</sub>V<sub>1</sub> + M<sub>2</sub>V<sub>2</sub> + M<sub>3</sub>V<sub>3</sub> + ... = M(V<sub>1</sub>+V<sub>2</sub>+V<sub>3</sub>)  
c)  $\frac{M_1}{V_1} + \frac{M_2}{V_2} + \frac{M_3}{V_3} + \dots = M \left( \frac{1}{V_1} + \frac{1}{V_2} + \frac{1}{V_3} \right)$     d)  $\frac{M_1}{V_1} + \frac{M_2}{V_2} + \frac{M_3}{V_3} + \dots = M_1 \left( \frac{1}{V_1} + \frac{1}{V_2} + \frac{1}{V_3} \right)$
73. The empirical formula and molecular mass of a compound are CH<sub>2</sub>O and 180 g respectively. What will be the molecular formula of the compound?  
a) C<sub>9</sub>H<sub>18</sub>O<sub>9</sub>    b) CH<sub>2</sub>O    c) C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>    d) C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>
74. Chemical reactions involve interaction of atoms and molecules. A large number of atoms/molecules (approximately 6.023 × 10<sup>23</sup>) are present in a few grams of any chemical compound varying with their atomic/molecular masses. To handle such large numbers conveniently, the mole concept was introduced. This concept has implications in diverse areas such as analytical chemistry, biochemistry, electrochemistry and radiochemistry. The following example illustrates a typical case, involving chemical! electrochemical reaction, which requires a clear understanding of the mole concept.  
A 4.0 molar aqueous solution of NaCl is prepared and 500 mL of this solution is electrolysed. This leads to the evolution of chlorine gas at one of the electrodes (atomic mass: Na = 23, Hg = 200; faraday = 96500 coulombs). The total number of moles of chlorine gas evolved is  
a) 0.5    b) 1.0    c) 2.0    d) 3.0
75. Suppose the elements X and Y combine to form two compounds XY<sub>2</sub> and X<sub>3</sub>Y<sub>2</sub>. When 0.1 mole of XY<sub>2</sub> weighs 10 g and 0.05 mole of X<sub>3</sub>Y<sub>2</sub> weighs 9 g, the atomic weights of X and Y are:  
a) 40, 30    b) 60, 40    c) 20, 30    d) 30, 20
76. The energy of photon is given as : ΔE/atom = 3.03 × 10<sup>-19</sup>J atom<sup>-1</sup>, then the wavelength (λ) of the photon is:  
a) 6.56 nm    b) 65.6 nm    c) 656 nm    d) 0.656 nm
77. Which of the following statements about the electron is incorrect?

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- a) It is a negatively charged particle. b) The mass of electron is equal to the mass of neutron.  
 c) It is a basic constituent of all atoms. d) It is a constituent of cathode rays.

78. The graph between momentum  $p$  and de-Broglie wavelength  $\lambda$  of photon is



79. The ratio of wavelength for II line of Balmer series and I line of Lyman series is

- a) 1 b) 2 c) 3 d) 4

80. Total number of spectral lines when electron jumps from 8th orbit to 2nd orbit

- a) 6 b) 36 c) 21 d) 38

81. The energy of the electron in a hydrogen atom has a negative sign for all possible orbits because:

- a) when the electron is attracted by the nucleus and is present in orbit  $n$ , the energy is emitted and its energy is lowered.  
 b) when the electron is attracted by the nucleus and is present in orbit  $n$ , the energy is absorbed and its energy is increased.  
 c) when the electron is repelled by the nucleus, the energy is released and its energy is lowered.  
 d) none of these.

82. The number of d-electrons in  $\text{Fe}^{2+}$  ( $Z = 26$ ) is not equal to the number of electrons in which one of the following?

- a) d-electrons in Fe ( $Z = 26$ ) b) p-electrons in Ne ( $Z = 10$ ) c) s-electrons in Mg ( $Z = 12$ )  
 d) p-electrons in Cl ( $Z = 17$ )

83. Consider the following six electronic configurations (remaining inner orbitals are completely filled) and mark the incorrect option.



- a) Stability order:  $\text{IV} > \text{II} > \text{III}$  b) Order of spin multiplicity:  $\text{IV} > \text{III} = \text{I} > \text{II}$   
 c) V does not violate all the three rules of electronic configuration  
 d) If IV represents  $\text{A}^+$  when kept near a magnet, acts as diamagnetic substance

84. Which atom (X) is indicated by the following configuration?



- a) Nitrogen b) Chlorine c) Phosphorus d) Sulphur

85. Which of the following is not a correct statement regarding the energies of orbitals?

- a) The lower the value of  $(n + l)$  for an orbital, lower is its energy  
 b) Electrons in the same subshell have equal energy  
 c) Energy of s-orbital is lower than the p-orbital and that of p-orbital is lower than the d-orbital  
 d) If two orbitals have same value for  $(n + l)$ , the orbital with higher value of  $n$  will have lower energy

86. The energy of an electromagnetic radiation is  $3 \times 10^{-12}$  ergs. What is its wavelength in nanometers?

( $h = 6.625 \times 10^{-27}$  erg. sec,  $C = 3 \times 10^{10}$  cm,  $\text{sec}^{-1}$ )

- a) 400 b) 228.3 c) 3000 d) 662.5

87. If  $r$  is the radius of the first orbit, the radius of  $n$ th orbit of H-atom is given by :

- a)  $rn^2$  b)  $rn$  c)  $r/n$  d)  $r^2n^2$

88. The angular momentum of electron in 'd' orbital is equal to:

- a)  $2\sqrt{3}\hbar$  b)  $\hbar$  c)  $\sqrt{6}\hbar$  d)  $\sqrt{2}\hbar$

89. As per de-Broglie formula, a macroscopic particle of mass 100 g and moving at a velocity of  $100 \text{ cm s}^{-1}$  will have a wavelength

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- a)  $6.6 \times 10^{-29}$  cm    b)  $6.6 \times 10^{-30}$  cm    c)  $6.6 \times 10^{-31}$  cm    d)  $6.6 \times 10^{-32}$  cm

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90. An electron is revolving in the 2<sup>nd</sup> orbit of He<sup>+</sup> ion. To this if 12.1 eV of energy supplied. Then to which orbit it will be excited.  
a) 6    b) 8    c) 4    d) 2
91. Which of the following quantum numbers are correct for the outermost electron of sodium atom?  
a)  $n = 4, l = 0, m = 0, s = +1/2$     b)  $n = 3, l = 0, m = 0, s = -1/2$     c)  $n = 3, l = 1, m = +1, s = +1/2$   
d)  $n = 3, l = 2, m = -1, s = -1/2$
92. The quantum number  $m$  of a free gaseous atom is associated with  
a) the effective volume of the orbital    b) the shape of the orbital    c) the spatial orientation of the orbital  
d) the energy of the orbital in the absence of a magnetic field
93. The atomic number of an element 'M' is 26. How many electrons are present in the M-shell of the element in its M<sup>3+</sup> state?  
a) 11    b) 15    c) 14    d) 13
94. The Bohr's orbit radius for the hydrogen atom ( $n=1$ ) is approximately 0.53 Å. The radius for the first excited state ( $n = 2$ ) orbit is:  
a) 0.27 Å    b) 1.27 Å    c) 2.12 Å    d) 3.12 Å
95. Which of the following designation is impossible?  
a) 4f    b) 5g    c) 2d    d) 6p
96. If uncertainty principle is applied to an object of mass 1 microgram, the uncertainty value of velocity and position will be  
a)  $0.2 \times 10^{-4} \text{ m}^2\text{s}^{-1}$     b)  $0.52 \times 10^6 \text{ m}^2\text{s}^{-1}$     c)  $0.52 \times 10^{-28} \text{ m}^2\text{s}^{-1}$     d)  $2 \times 10^{-34} \text{ m}^2\text{s}^{-1}$
97. Which of the following is not correctly matched?  
a) Energy associated with Bohr's orbit,  $E = \frac{-2.18 \times 10^{-18} J \times Z^2}{n^2}$   
b) Energy gap between two orbits,  $\Delta E = R_H \left( \frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$   
c) Kinetic energy of the ejected electron,  $h\nu = h\nu_0 + \frac{1}{2}mv^2$     d) Energy of one mole of photons,  $E = N_0 \frac{h\nu}{c}$
98. Three elements 'X', 'Y' and 'Z' have atomic numbers 18, 19 and 20 respectively. How many electrons are present in the M shells of these elements?  
a) 8,9,10    b) 8,10,13    c) 8,8,8    d) 8,9, 12
99. Two atoms are said to be isobars if  
a) they have same atomic number but different mass number  
b) they have same number of electrons but different number of neutrons  
c) they have same number of neutrons but different number of electrons  
d) sum of the number of protons and neutrons is same but the number of protons is different
100. An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the atomic symbol.  
a)  ${}_{34}^{81}\text{Br}$     b)  ${}_{35}^{81}\text{Br}$     c)  ${}_{36}^{81}\text{Sr}$     d)  ${}_{37}^{81}\text{Sr}$
101. What would be the wavelength and name of series respectively for the emission transition for H-atom if it starts from the orbit having radius 1.3225 nm and ends at 211.6 pm?  
a) 434 nm, Balmer    b) 434 pm, Paschen    c) 545 pm, Pfund    d) 600 nm, Lyman
102. Which of the following conclusions could not be derived from Rutherford's  $\alpha$ -particle scattering experiment?  
a) Most of the space in the atom is empty.  
b) The radius of the atom is about  $10^{-10}$  m while that of nucleus is  $10^{-15}$  m.  
c) Electrons move in a circular path of fixed energy called orbits.  
d) Electrons and the nucleus are held together by electrostatic forces of attraction.
103. Which of the following has highest value of magnetic moment?

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- a)  $\text{Fe}^{2+}$  b)  $\text{Mn}^{+2}$  c)  $\text{Cr}^{+3}$  d)  $\text{V}^{+3}$

104. The radioactive isotope, tritium ( ${}^3_1\text{H}$ ) has a half-life of 12.3 years. If the initial amount of tritium is 32 mg, how many milligrams of it would remain after 49.2 years?  
a) 8 mg b) 1 mg c) 2 mg d) 4 mg
105. **Assertion:** According to de Broglie, the wavelengths associated with electrons and other subatomic particles can be detected experimentally.  
**Reason:** The wavelength associated with any material particle is directly proportional to its mass.  
a) If both assertion and reason are true and reason is the correct explanation of assertion  
b) If both assertion and reason are true but reason is not the correct explanation of assertion  
c) If assertion is true but reason is false d) If both assertion and reason are false
106. Which one is not in agreement with Bohr's model of the atom?  
a) Line spectra of hydrogen atom b) Pauli's exclusion principle c) Planck's theory  
d) Heisenberg's uncertainty principle
107. Which of the following options does not represent ground state electronic configuration of an atom?  
a)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$  b)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$  c)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$   
d)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$
108. If  $n = 6$ , the correct sequence for filling of electrons will be:  
a)  $ns \rightarrow (n-1)f \rightarrow (n-1)d \rightarrow np$  b)  $ns \rightarrow (n-1)f \rightarrow (n-2)d \rightarrow np$  c)  $ns \rightarrow (n-2)f \rightarrow (n-1)d \rightarrow np$   
d)  $ns \rightarrow np \rightarrow (n-1)d \rightarrow (n-2)f$
109. Kinetic energy of photoelectrons is independent of incident radiation \_\_\_\_\_  
a) Wavelength b) Wave number c) Frequency d) Intensity
110. The number of spherical nodes in 3p-orbital is/are:  
a) one b) two c) three d) none of the above
111. Which one of the following pairs of ions have the same electronic configuration:  
a)  $\text{Cr}^{3+}$ ,  $\text{Fe}^{3+}$  b)  $\text{Fe}^{3+}$ ,  $\text{Mn}^{2+}$  c)  $\text{Fe}^{3+}$ ,  $\text{Co}^{3+}$  d)  $\text{Sc}^{3+}$ ,  $\text{Cr}^{3+}$
112. The orbitals are called degenerate when:  
a) they have the same wave functions b) they have the same wave functions but different energies  
c) they have different wave functions but same energy d) they have the same energy
113. Consider the ground state of Cr atom ( $Z = 24$ ). The numbers of electrons with azimuthal quantum numbers,  $\ell = 1$  and 2, are respectively:  
a) 12, 4 b) 12, 5 c) 16, 4 d) 16, 5
114. The graph between photo electron current (c) and intensity of photon (I)  
a)  b)  c)  d) 
115. The radius of which of the following orbit is same as radius of 1st orbit of H  
a)  $\text{He}^+(n=2)$  b)  $\text{Li}^{2+}(n=2)$  c)  $\text{Li}^{2+}(n=3)$  d)  $\text{Be}^{3+}(n=2)$
116. Though the five d-orbitals are degenerate, the first four d-orbitals are similar to each other in shape whereas the fifth d-orbital is different from others. What is the name of the fifth orbital?  
a)  $d_{x^2-y^2}$  b)  $d_z^2$  c)  $d_{xz}$  d)  $d_{xy}$
117. Given below are the spectral lines for an atom of hydrogen. Mark the lines which are not correctly matched with the value of  $n_1$  and  $n_2$ ?

	Series	$n_1$	$n_2$	Region
(i)	Lyman	1	2,3,....	Ultraviolet
(ii)	Balmer	2	3,4,....	Infrared
(iii)	Paschen	3	4,5,....	Infrared
(iv)	Pfund	4	5,6,....	Infrared

- a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (i) and (iv)

118. The age of most ancient geological formation is estimated by  
 a) potassium-argon method    b) carbon-14 dating method    c) radium- silicon method  
 d) uranium-lead method
119. For a particular value of azimuthal quantum number ( $l$ ), the total number of magnetic quantum number values ( $m$ ) is given by  
 a)  $l = \frac{m+1}{2}$     b)  $l = \frac{m-1}{2}$     c)  $l = \frac{2m+1}{2}$     d)  $n = \frac{2l+1}{2}$
120. The energy associated with the first orbit in the hydrogen atom is  $-2.18 \times 10^{-18} \text{ J atom}^{-1}$ , What is the energy associated with  $n = 5$ ?  
 a)  $0.43 \times 10^{-18} \text{ J}$     b)  $-0.087 \times 10^{-18} \text{ J}$     c)  $2.18 \times 10^{-18} \text{ J}$     d)  $3.16 \times 10^{-15} \text{ J}$
121. If the energy of H-atom in the ground state is  $-E$ , the velocity of photo-electron emitted when a photon having energy  $E_p$  strikes a stationary  $\text{Li}^{2+}$  ion in ground state, is given by:  
 a)  $v = \sqrt{\frac{2(E_p - E)}{m}}$     b)  $v = \sqrt{\frac{2(E_p + 9E)}{m}}$     c)  $v = \sqrt{\frac{2(E_p - 9E)}{m}}$     d)  $v = \sqrt{\frac{2(E_p - 3E)}{m}}$
122. Which of the following is not permissible arrangement of electrons in an atom?  
 a)  $n = 5, l = 3, m = 0, s = +1/2$     b)  $n = 3, l = 2, m = -3, s = -1/2$     c)  $n = 3, l = 2, m = -2, s = -1/2$   
 d)  $n = 4, l = 0, m = 0, s = +1/2$
123. Match the column I with column II and mark the appropriate choice.
- | Column I                            | Column II                       |
|-------------------------------------|---------------------------------|
| (A) Uncertainty of an object        | (i) $\frac{5.29 \times n^2}{Z}$ |
| (B) Bohr's radius of an orbit       | (ii) $\frac{h}{4\pi m}$         |
| (C) Angular momentum of an electron | (iii) $\frac{h}{mv}$            |
| (D) de Broglie wavelength           | (iv) $n \cdot \frac{h}{2\pi}$   |
- a) (A)  $\rightarrow$  (iii), (B)  $\rightarrow$  (iv), (C)  $\rightarrow$  (i), (D)  $\rightarrow$  (ii)    b) (A)  $\rightarrow$  (ii), (B)  $\rightarrow$  (i), (C)  $\rightarrow$  (iv), (D)  $\rightarrow$  (iii)  
 c) (A)  $\rightarrow$  (iv), (B)  $\rightarrow$  (iii), (C)  $\rightarrow$  (i), (D)  $\rightarrow$  (ii)    d) (A)  $\rightarrow$  (i), (B)  $\rightarrow$  (ii), (C)  $\rightarrow$  (iv), (D)  $\rightarrow$  (iii)
124. The energy of an electron in the  $n$ th Bohr orbit of hydrogen atom is:  
 a)  $-\frac{13.6}{n^4} \text{ eV}$     b)  $-\frac{13.6}{n^3} \text{ eV}$     c)  $-\frac{13.6}{n^2} \text{ eV}$     d)  $-\frac{13.6}{n} \text{ eV}$
125. The value of  $e/m$  for an element is  
 a)  $1.78 \times 10^8 \text{ c/g}$     b)  $1.6724 \times 10^{-24} \text{ c/g}$     c)  $0.005486 \text{ c/g}$     d)  $1.00866 \text{ c/g}$
126. If  ${}^A_Z X$  emits firstly a positron, then two  $\alpha$  and two  $\beta$  in the last  $\alpha$  is emitted and finally it converts to  ${}^C_D Y$ . The correct relation is  
 a)  $a = c + 12, d = b - 5$     b)  $a = c + 8, d = b - 1$     c)  $a = c + 6, d = b - 2$     d)  $a = c + 4, d = b - 2$
127. The number of angular nodal planes are same in the orbitals:  
 a) 3p and 4p    b) 3s and 4d    c) 4s and 3p    d) 4s and 3d
128. For the electrons of oxygen atom, which of the following statements is correct?  
 a)  $Z_{\text{eff}}$  for an electron in a 2s orbital is the same as  $Z_{\text{eff}}$  for an electron in a 2p orbital  
 b) An electron in the 2s orbital has the same energy as an electron in the 2p orbital  
 c)  $Z_{\text{eff}}$  for an electron in 1s orbital is the same as  $Z_{\text{eff}}$  for an electron in a 2s orbital  
 d) The two electrons present in the 2s orbital have spin quantum numbers,  $m_s$  but of opposite sign
129. Energy equal to the mass of one electron is:  
 a)  $8.2 \times 10^{-7} \text{ erg}$     b)  $9.2 \times 10^{-8} \text{ erg}$     c)  $8.2 \times 10^{-10} \text{ erg}$     d)  $4.1 \times 10^{-8} \text{ erg}$
130. The total number of electrons that can be accommodated in all the orbitals having principal quantum number 2 and azimuthal quantum number 1 are:  
 a) 2    b) 4    c) 6    d) 8

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131. The uncertainties in the velocities of two particles A and B are 0.05 and  $0.02\text{ m sec}^{-1}$  respectively. The mass of B

is five times to that of mass A. What is the ratio of uncertainties  $\left(\frac{\Delta x_A}{\Delta x_B}\right)$  in that positions

- a) 2   b) 0.25   c) 4   d) 1

132. What is the trend of energy of Bohr's orbits?

- a) Energy of the orbit increases as we move away from the nucleus  
b) Energy of the orbit decreases as we move away from the nucleus  
c) Energy remains same as we move away from the nucleus   d) Energy of Bohr's orbit cannot be calculated

133. If uncertainty in measurement of position and momentum are equal calculate the uncertainty in velocity

- a)  $\frac{\Delta p}{m}$    b)  $\frac{m}{\Delta p}$    c)  $m\Delta p$    d)  $\frac{1}{m\Delta p}$

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

- a)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$    b)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$    c)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$   
d)  $1s^2 2s^2 2p^2 3s^6 3p^6 3d^5 4s^1$

35. The hydrogen-like species  $\text{Li}^{2+}$  is in a spherically symmetric state  $S_1$  with one radial node. Upon absorbing light the ion undergoes transition to a state  $S_2$ . The state  $S_2$  has one radial node and its energy is equal to the ground state energy of the hydrogen atom.

The orbital angular momentum quantum number of the state  $S_2$  is

- a) 0   b) 1   c) 2   d) 3

36. Which of the following explains the sequence of filling electrons in different subshells?

- a) Hund's rule   b) Aufbau principle   c) Pauli's principle   d) All of these

37. The de Broglie wavelength associated with a ball of mass 200 g and moving at a speed of 5 metres/hour, is of the order of ( $h = 6.625 \times 10^{-34}$  Js) is:

- a)  $10^{-15}$  m   b)  $10^{-20}$  m   c)  $10^{-25}$  m   d)  $10^{-30}$  m

38. How many number of electrons are present in a particle which carries a charge of  $5.5 \times 10^{-16}$  C?

- a) 3432   b) 1560   c) 8240   d) 2432

39. The velocity of an electron in a certain Bohr orbit of H-atom bears the ratio 1:275 to the velocity of light. The quantum number (n) of the orbit is

- a) 3   b) 2   c) 1   d) 4

40. Half-life for radioactive  $^{14}\text{C}$  is 5760 yr. In how many years, 200 mg of  $^{14}\text{C}$  will be reduced to 25 mg?

- a) 5760 yr   b) 11520 yr   c) 17280 yr   d) 23040 yr

41. One microgram of radioactive sodium  $^{24}_{11}\text{Na}$  with a half-life of 15 h was injected into a living system for a bio assay. How long will it take for the radioactivity to fall to 25% of the initial value?

- a) 60 h   b) 22.5 h   c) 375 h   d) 30 h

42. (A): The energy of ultraviolet radiation is greater than the energy of infrared radiation

(R) : The velocity of ultraviolet radiation is greater than the velocity of infrared radiation

- a) Both A and R are true and R is the correct explanation of A  
b) Both A and R are true but R is not the correct explanation of A   c) A is true and R is false  
d) R is true and A is false

143. The frequency of the matter wave of a particle is given by

- a)  $\frac{2K.E}{h}$    b)  $\frac{K.E}{2h}$    c)  $\frac{h}{2K.E}$    d)  $\frac{K.E}{h}$

144. Maximum number of radial nodes is present in:

- a) 5s   b) 5p   c) 5d   d) all have same number of nodes

145. In electromagnetic radiation, which of the following has greater wavelength than visible light?

- a) U.V-rays   b) I.R-rays   c) Gamma rays   d) X-rays

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146. If  $n$  and  $l$  are principle and azimuthal quantum numbers respectively, then the expression for calculating the total number of electrons in any energy level is

- a)  $\sum_{l=0}^{l=n} 2(2l+1)$    b)  $\sum_{l=1}^{l=n} 2(2l+1)$    c)  $\sum_{l=0}^{l=n} 2(2l+1)$    d)  $\sum_{l=0}^{l=n-1} 2(2l+1)$

147. If  $r$  is the radius of the first orbit, the radius of  $n$ th orbit of H-atom is given by

- a)  $rn^2$    b)  $rn$    c)  $\frac{r}{n}$    d)  $r^2n^2$

148. How many electrons in an atom have the following quantum numbers?

$n=4, m_s = -1/2$

- a) 32   b) 18   c) 8   d) 16

149. Ground state electronic configuration of nitrogen atom can be represented by:

- a)  $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow$    b)  $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow$    c)  $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow$    d)  $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow$

150. The hydrogen-like species  $Li^{2+}$  is in a spherically symmetric state  $S_1$  with one radial node. Upon absorbing light the ion undergoes transition to a state  $S_2$ . The state  $S_2$  has one radial node and its energy is equal to the ground state energy of the hydrogen atom.

The state  $S_1$  is

- a) 1s   b) 2s   c) 2p   d) 3s

151. Which of the following statement is/are incorrect about the modern form of periodic table?

- a) Third group of periodic table accommodates maximum number of elements  
b) Due to presence of half filled and fully subshells in electronic configuration electronegativity of atom increases  
c) The element of 13th group and 7th period will have atomic number 113  
d) Diagonal relationship in 2nd and 3rd period element is found due to similar polarising power.

152. The number of protons, neutrons and electrons in  ${}_{71}^{175}Lu$  respectively, are:

- a) 175, 104 and 71   b) 71, 104 and 71   c) 104, 71 and 71   d) 71, 71 and 104

153. Predict the formula of stable compound formed by an element with atomic number 114 and fluorine.

- a)  $AF_3$    b)  $AF_2$    c)  $AF$    d)  $AF_4$

154. Ionic radii are

- a) inversely proportional to effective nuclear charge  
b) inversely proportional to square of effective nuclear charge  
c) directly proportional to effective nuclear charge  
d) directly proportional to square of effective nuclear charge

155. Atomic numbers of actinides are

- a) 57 to 71   b) 80 to 103   c) 58 to 71   d) 90 to 103

156. Aqueous solutions of two compounds  $M-O-H$  and  $M'-O-H$  have been prepared in two different beakers. If the electronegativity of  $M = 3.5$ ,  $M' = 1.72$ ,  $O = 3.0$  and  $H = 2.1$ , then the solutions respectively are

- a) acidic, acidic   b) acidic, basic   c) basic, basic   d) basic, acidic.

157. In which of the following, the order is not in accordance with the property mentioned?

- a)  $Li < Na < K < Rb$  - Atomic radius   b)  $F > N > O > C$  - Ionisation enthalpy  
c)  $Si < P < S < Cl$  - Electronegativity   d)  $F < Cl < Br < I$  - Electronegativity

158. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?

- a)  $Be_2C$  like  $Al_4C_3$  yields methane on hydrolysis   b) Be, like Al is rendered passive by  $HNO_3$   
c)  $Be(OH)_2$  like  $Al(OH)_3$  is basic   d) Be forms beryllates and Al forms aluminate

159. Which is the most non-metallic element among the following

- a)  $1s^2 2s^2 2p^6 3s^1$    b)  $1s^2 2s^2 2p^5$    c)  $1s^2 2s^2 2p^6 3s^2$    d)  $1s^2 2s^2 2p^3$

160. One of the characteristic properties of non-metals is that they

- a) are reducing agents   b) form basic oxides   c) form cations by electron gain   d) are electronegative

161. Which has the highest second ionization potential?

- a) Nitrogen   b) Carbon   c) Oxygen   d) Fluorine

162. In which of the following sets, elements have nearly same atomic radii?

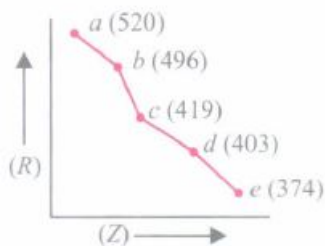
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- a) Li, Be, B   b) Mg, Ca, Sr   c) Fe, Co, Ni, Cu   d) O, S, Se

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163. In the given graph, a periodic property (R) is plotted against atomic numbers (Z) of the elements. Which property is shown in the graph and how it is correlated with reactivity of the elements?



- a) Ionisation enthalpy in a group, reactivity decreases from a -7 e.  
 b) Ionisation enthalpy in a group, reactivity increases from a -7 e.  
 c) Atomic radius in a group, reactivity decreases from a -7 e.  
 d) Metallic character in a group, reactivity increases from a -7 e.
164. Which of the following electronic configuration of an atom has the lowest ionization enthalpy?  
 a)  $1s^2, 2s^2, 2p^5$    b)  $1s^2, 2s^2 2p^3$    c)  $1s^2, 2s^2 2p^6, 3s^1$    d)  $1s^2, 2s^2 2p^6$
165. In which of the following options order of arrangement does not match with the variation of property indicated against it?  
 a)  $A^{3+} < Mg^{2+} < Na^+ < F^-$  (increasing ionic size)   b)  $B < C < N < O$  (increasing first ionisation enthalpy)  
 c)  $I < Br < F < Cl$  (increasing electron gain enthalpy)   d)  $Li < Na < K < Rb$  (increasing metallic radius)
166. Which one of the following arrangements does not truly represent the property indicated against it?  
 a)  $Br_2 < Cl_2 < F_2$  Oxidising power   b)  $Br_2 < Cl_2 < F_2$  Electronegativity   c)  $Br_2 < F_2 < Cl_2$  Electron affinity  
 d)  $Br_2 < Cl_2 < F_2$  Bond energy
167. Which of the following can most easily form unipositive gaseous ion?  
 a)  $1s^2 2s^2 2p^6 3s^2$    b)  $1s^2 2s^2 2p^6 3s^1$    c)  $1s^2 2s^2 2p^6 3s^2 3p^1$    d)  $1s^2 2s^2 2p^6 3s^2 3p^3$
168. The metal which can form a stable binary halide of the formula  $MX_2$  (X = halogen) :  
 a) P   b) Q   c) U   d) S
169. What is the name and symbol of the element with atomic number 112?  
 a) Ununbium, Uub   b) Unnilbium, Unb   c) Ununillium, Uun   d) Ununtrium, Uut
170. Few general names are given along with their valence shell configurations. Mark the incorrect name:  
 a)  $ns^2 np^6$  - Noble gases   b)  $ns^2 np^5$  - Halogens   c)  $ns^1$  - Alkali metals   d)  $ns^2 np^2$  - Chalcogens
171. Which electronic configuration of an element has abnormally high difference between second and third ionisation energy.  
 a)  $1s^2, 2s^2 2p^6, 3s^1$    b)  $1s^2, 2s^2 2p^6, 3s^2 3p^1$    c)  $1s^2, 2s^2 2p^6, 3s^2 3p^2$    d)  $1s^2, 2s^2, 2p^6, 3s^2$
172. Which of the following is the correct order of size of the given species?  
 a)  $I > I^- > I^+$    b)  $I^+ > I^- > I$    c)  $I > I^+ > I^-$    d)  $I^- > I > I^+$
173. Fluorine is more electronegative than nitrogen, The best explanation is that  
 a) The valence electrons in F are on the average, a little farther to the nucleus than in N.  
 b) The charge on a F nucleus is +9, while that on N nucleus is +7  
 c)  
 The nitrogen has half filled valence shell electron configuration,  $ns-np^3$  where as fluorine has partially filled electron configuration  $ns^2 np^5$   
 d)  
 The electronegativity decreases from top to bottom in each of the group as the effective nuclear charge remains constant.
174. Which of the following is the atomic number of a metal?  
 a) 35   b) 34   c) 36   d) 38
175. The oxidation state of an element in a particular compound can be defined as

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 the charge acquired by its atom on the basis of electronegative consideration from other atoms in the molecule  
 b) the residual charge acquired by its atom after removing all electronegative atoms from the molecule  
 c) the valency of the most electronegative atom present in the molecule  
 d) total number of electrons accepted by an atom to form a molecule.

176. Which of the following does not represent the correct order of the properties indicated?

- a)  $\text{Ni}^{2+} > \text{Cr}^{2+} > \text{Fe}^{2+} > \text{Mn}^{2+}$  (size)    b)  $\text{Sc} > \text{Ti} > \text{Cr} > \text{Mn}$  (size)  
 c)  $\text{Mn}^{2+} > \text{Ni}^{2+} < \text{CO}^{2+} < \text{Fe}^{2+}$  (unpaired electron)    d)  $\text{Fe}^{2+} > \text{CO}^{2+} > \text{Ni}^{2+} > \text{Cu}^{2+}$  (unpaired electron)

177. The characteristic properties of transition elements are due to

- a) Unpaired electrons in d-sub shell    b) d-orbitals have five fold degeneracy  
 c) Presence of 2 nodal planes for d-orbital    d) Because they belong to d-block

178. **Assertion:** Boron can only form  $[\text{BF}_4]^-$  whereas aluminium forms  $[\text{AlF}_6]^{3-}$ .

**Reason:** The first member of a group of elements in the s- and p- blocks shows anomalous behaviour.

- a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 c) If assertion is true but reason is false.    d) If both assertion and reason are false.

179. In the periodic table, the elements are arranged in the periods following the

- a) Hund's rule of maximum multiplicity    b) Pauli's exclusion principle    c) Aufbau principle  
 d) Both (1) and (2)

180. Fill in the blanks with appropriate option.

The ability of an atom to attract shared electrons to itself is called (i). It is generally measured on the (ii) scale. An arbitrary value of (iii) is assigned to fluorine (have greatest ability to attract electrons). It generally (iv) across a period and (v) down a group

a)

i	ii	iii	iv	v
polarity	Pauling	2.0	decreases	increases

b)

i	ii	iii	iv	v
electronegativity	Pauling	4.0	decreases	increases

c)

i	ii	iii	iv	v
valency	Mulliken	1.0	decreases	increases

d)

i	ii	iii	iv	v
electron affinity	Mulliken	2.0	increases	increases

181. What is the common property of the oxides CO, NO and  $\text{N}_2\text{O}$ ?

- a) All are basic oxides.    b) All are neutral oxides    c) All are amphoteric oxides    d) All are acidic oxides

182. Why is the electron gain enthalpy of O or F less than that of S or Cl?

- a) O and F are more electronegative than S and Cl.

b)

When an electron is added to O or F, it goes to a smaller ( $n = 2$ ) level and suffers more repulsion than the electron in S or Cl in larger level ( $n = 3$ ).

- c) Adding an electron to 3p-orbital leads to more repulsion than 2p-orbital.

- d) Electron gain enthalpy depends upon the electron affinity of the atom.

183.  $\text{K}^+$  and  $\text{Cl}^-$  ions are isoelectronic. Which of the statements is not correct?

- a) Both  $\text{K}^+$  and  $\text{Cl}^-$  ions contain 18 electrons.    b) Both  $\text{K}^+$  and  $\text{Cl}^-$  ions have same configuration.  
 c)  $\text{K}^+$  ion is bigger than  $\text{Cl}^-$  ion in ionic size.    d)  $\text{Cl}^-$  ion is bigger than  $\text{K}^+$  ion in ionic size.

184. If electro negativity of x be 3.2 and that of y be 2.2, the percentage ionic character of xy is

- a) 19.5    b) 18.5    c) 9.5    d) 29.5

185. Which one of the following oxides is not neutral?

- a) CO    b)  $\text{OF}_2$     c)  $\text{NO}_2$     d) both (b) and (c)

186. Identify the wrong statement in the following :

- a) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius.  
 b) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius.

c) Atomic radius of the elements increases as one moves down the first group of the periodic table.  
d)

Atomic radius of the elements decreases as one moves across from left to right in the 2<sup>nd</sup> period of the periodic table.

187. The magnitude of first ionisation energy for Na (according to formula given) is equal to :

- a) energy of its 3s electron   b) energy of its 1s electron   c) energy of its 2s electron  
d) energy of its 2p electron

188. An ion  $M^{3+}$  has electronic configuration  $[Ar]3d^{10}4s^2$ , Element M belongs to:

- a) s-block   b) p-block   c) d-block   d) f-block

189. Few values are given in the table in the direction from left to right and top to bottom. Predict the property which could be depicted in the table.

152						
186	160	143	117	110	104	99
231						
244						
262						

- a) Atomic number   b) Ionisation enthalpy   c) Atomic radius   d) Electron gain enthalpy

190. The species Ar,  $K^+$  and  $Ca^{2+}$  contain the same number of electrons. In which order do their radii increase?

- a)  $Ca^{2+} < K^+ < Ar$    b)  $K^+ < Ar < Ca^{2+}$    c)  $Ar < K^+ < Ca^{2+}$    d)  $Ca^{2+} < Ar < K^+$

191. (A), (B) and (C) are elements in the third short period. Oxide of (A) is ionic, that of (B) is amphoteric and of (C) a giant molecule. (A), (B) and (C) have atomic number in the order:

- a)  $(A) < (B) < (C)$    b)  $(C) < (B) < (A)$    c)  $(A) < (C) < (B)$    d)  $(B) < (A) < (C)$

192. Which of the following element has maximum electron affinity?

- a) Cl   b) Br   c) I   d) F

193. First and second ionization enthalpies (in kJ/mol) of few elements are given below:

Element	$IE_1$	$IE_2$
(i)	520	980
(ii)	900	1760
(iii)	1680	3380
(iv)	2080	3963

Which of the above elements will form halides with formula  $MX_2$ ?

- a) (i) and (ii)   b) (i) and (iii)   c) (ii) and (iii)   d) (i) and (iv)

194. In the isoelectronic species the ionic radii of  $N^{3-}$ ,  $O^{2-}$  and  $F^-$  are respectively given by

- a) 1.36, 1.71, 1.40   b) 1.36, 1.40, 1.71   c) 1.71, 1.36, 1.40   d) 1.71, 1.40, 1.36

195. An increase in both atomic and ionic radii with atomic number occurs in any group of the periodic table and in accordance with this the ionic radii of  $Ti^{2+}$  and  $Zr^{4+}$  ions are  $0.68 \text{ \AA}$  and  $0.74 \text{ \AA}$  respectively; but for  $Hf^{4+}$  ion, the ionic radius is  $0.75 \text{ \AA}$ , which is almost the same as that for  $Zr^{4+}$  ion. This is due to

- a) Greater degree of covalency in compounds of  $Hf^{4+}$    b) Lanthanide contraction   c) Actinide contraction  
d) Difference in co-ordination number of  $Zn^{4+}$  and  $Hf^{4+}$  in their compounds

196. The first ionisation enthalpy of the elements C, N, P, Si are in the order of

- a)  $C < N < Si < P$    b)  $N < Si < C < P$    c)  $Si < P < C < N$    d)  $P < Si < N < C$

197. Amongst the elements with following electronic configurations, which one may have the highest ionization energy?

- a)  $[Ne] 3s^2 3p^3$    b)  $[Ne] 3s^2 3p^2$    c)  $[Ar] 3d^{10}, 4s^2, 4p^3$    d)  $[Ne] 3s^2, 3p^1$

198. As per the modern periodic law, the physical and chemical properties of elements are in periodic functions of their

- a) atomic number   b) electronic configuration   c) atomic weight   d) atomic size

199. Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species?

- a)  $Cl < F < S < O$    b)  $O < S < F < Cl$    c)  $S < O < Cl < F$    d)  $F < Cl < O < S$

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200. When we go from left to right in a period:

- a) the basic nature of the oxides increases    b) the basic nature of the oxides decreases  
c) there is no regular trend in the nature of oxides    d) oxides of only first two groups are basic in nature.

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