

SATISH SCIENCE ACADEMY

**DHANORI PUNE-411015** 

## STRUCTURE OF THE ATOM

Class 09 - Science

Time All	owed: 3 hours	Maximum Marks: 151	
Section A			
1.	Calculate the formula unit mass of ZnCl <sub>2</sub> ? (nearest a	pproximation) [1]	
	a) 111 u	b) 123 u	
	c) 124 u	d) 137 u	
2.	Symbol of Iron is:-		
	a) Ir	b) Fe	
	c) Mg	d) I	
3.	Which of the following elements are present in Quick lime?		
	A. Calcium, Oxygen		
	B. Sodium, Hydrogen, Oxygen		
	C. Calcium, Bromine		
	D. Calcium chloride		
	a) (B)	b) (D)	
	c) (C)	d) (A)	
4.	The number of molecules in CuSO <sub>4</sub> .5H <sub>2</sub> O bonded by H-bond is		
	a) 5	b) 3	
	c) 2	d) 1	
5.	The maximum amount of sodium that can be obtained by electrolysis of 117 g of sodium chloride is		
	[Atomic mass of Na = 23 u, Cl = 35.5 u]		
	a) 40 g	b) 52 g	
	c) 23 g	d) 46 g	
6.	Which of the following represents a correct chemical	formula? Name it. [1]	
	a) NaSO <sub>4</sub>	b) NaS	
	c) CaCl	d) BiPO <sub>4</sub>	
7.	An ionic compound of element M and chlorine has the	ne formula, MCl <sub>3</sub> . The molecular mass of MCl <sub>3</sub> is 118.5. [1]	
	What will be the molecular mass of the oxide of elen	nent M?	
	a) 72	b) 44	
	c) 28	d) 99	

8.	Four different experiments were conducted in the fol	lowing ways:	[1]
	i. 3 g of carbon was burnt in 8 g of oxygen to give	11 g of CO <sub>2</sub> .	
	ii. 1.2 g of carbon was burnt in air to give 4.2 g of C	CO <sub>2</sub> .	
	iii. 4.5 g of carbon was burnt in enough air to give 11 g of $CO_2$ .		
	iv. 4 g of carbon was burnt in oxygen to form 30.3 g	of CO <sub>2</sub> .	
	Law of constant proportions is not illustrated in expe	eriment(s).	
	a) i and iii only	b) ii, iii and iv only	
	c) iv only	d) i only	
9.	An element P forms an oxide with formula PO. The	formulae of its sulphate and phosphate will be respectively	[1]
	a) $P_2(SO_4)_3$ and $PPO_4$	b) $PSO_4$ and $P_2(PO_4)_3$	
	c) $P(SO_4)_2$ and $P(PO_4)_2$	d) $PSO_4$ and $P_3(PO_4)_2$	
10.	A sample of CaCO <sub>3</sub> contains 3.01 $\times~10^{23}$ ions of Ca	$^{+2}$ and $CO_3^{-2}$ . The mass of the sample is:	[1]
	a) 200 g	b) 50 g	
	c) 100 g	d) 5 g	
11.	A change in the physical state can be brought about		[1]
	a) when energy is either given to, or taken out from the system	b) without any energy change	
	c) only when energy is taken out from the	d) only when energy is given to the system	
	system		
12.	The chemical symbol for sodium is		[1]
	a) Sd	b) K	
	c) So	d) Na	
13.	Two samples X and Y of a pure substance obtained b	by two different methods contain elements P and Q.	[1]
	Substance X has a mass of 2.25 g and contains 0.90 g	g of Q. Substance Y is made up of 60% P and 40% Q by	
	weight. This is an illustration of		
	a) Law of conservation of mass	b) Law of multiple proportions	
	c) Law of simple proportion	d) Law of constant proportions	
14.	440 g of carbon dioxide can be represented as		[1]
	i. 5 g mole of carbon dioxide		
	ii. 10 moles of carbon dioxide		
	iii. $6.023 \times 10^{23}$ molecules of carbon dioxide		
	iv. 6.023 $\times$ 10 <sup>24</sup> molecules of carbon dioxide		
	a) (ii) and (iii) only	b) (i), (ii), (iii) and (iv)	
	c) (i) and (ii) only	d) (ii) and (iv) only	
15.	What mass of CO $_2$ will 3.011 $ imes$ 10 <sup>23</sup> molecules con	tain?	[1]

	a) 4.4 g	b) 11.0 g	
	c) 44.0 g	d) 22.0 g	
16.	What information do we get from the molecular form	ula?	[1]
	a. It represents one molecule of the substance.		
	b. It does not tell the name of the substance.		
	c. It tells about the type of atoms.		
	d. It represents the formula mass unit of the substanc	e.	
	a) (b) and (c) are correct	b) All of these	
	c) (a) and (b) are correct	d) (a), (c) and (d) are correct	
17.	What are a and b? Volume of gas at STP a b		[1]
	Number of molecules (N)       c       Number of moles (n) $d$ Multiply by molar mass (M) $f$ Divide by molar mass (M)         Mass in grams       Mass in grams $f$		
	a) a = divide by 22.4 L, b - multiply by 22.4 L	b) a = divide by 22.4 L, b = divide by 22.4 L	
	c) a = multiply by 22.4 L, b = multiply by 22.4	d) a = multiply by 22.4 L, b = divide by 22.4 L	
	L		
18.	Sulphate of a divalent metal M exists in hydrated form	n. If 0.10 mol of metal sulphate combines with 9.0 g of	[1]
	water to form the hydrated salt then, the formula of m	etal sulphate will be	
	a) $M_2SO_4$ ·3H <sub>2</sub> O	b) MSO <sub>4</sub> .5H <sub>2</sub> O	
	c) $M_2SO_4 \cdot 2H_2O$	d) MSO <sub>4</sub> ·H <sub>2</sub> O	
19.	The formula for quicklime is		[1]
	a) Ca(OH) <sub>2</sub>	b) CaCl <sub>2</sub>	
	c) CaO	d) CaCO <sub>3</sub>	
20.	The sample of water from a well is analysed. What wi	ll be the ratio of hydrogen and oxygen in it by mass?	[1]
	a) 16:1	b) 8:1	
	c) 1:16	d) 1:8 or 2:16	
21.	Assertion (A): The molecular mass and formula unit	mass of a substance is the sum of atomic masses of all the	[1]
	atoms in the molecular formula or formula unit of a co	ompound.	

**Reason (R):** The only difference between the molecular mass and formula unit mass is that former is for molecular compounds (covalent compounds) and the latter is for ionic compounds. However, their numerical value is the same.

a) Both A and R are true and R is the correct b) Both A and R are true but R is not the

	explanation of A.	correct explanation of A.	
	c) A is true but R is false.	d) A is false but R is true.	
22.	Assertion (A): An atom is very huge in size.		[1]
	<b>Reason (R):</b> About one million atoms are stacked tog	ether to equal the thickness of a sheet of paper.	
	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 but R is false.	d) A is false but R is true.	
23.	Assertion (A): Earlier, hydrogen was taken as a stand	lard for measuring the atomic masses of elements.	[1]
	<b>Reason (R):</b> Later, carbon-12 isotope was chosen as a	a standard for measuring the atomic masses of elements.	
	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 but R is false.	d) A is false but R is true.	
24.	<b>Assertion (A):</b> 1amu equals to $1.6 \times 10^{-24}$ g.		[1]
	<b>Reason (R):</b> $1.6 \times 10^{-24}$ g. equals to $\frac{1}{12}$ th of mass of	a C-12 atom.	
	a) Both A and R are true and R is the correct	b) Both A and R are true but R is not the	
	c) $\Lambda$ is true but P is false	d) A is false but P is true	
25	Assertion (A). Berzelius was the first scientist to use	symbols for elements	[1]
20.	<b>Reason (R):</b> He suggested that the symbols of the ele	ments can be made from one to two letters of the name of	[-]
	the element.		
	a) Both A and R are true and R is the correct	b) Both A and R are true but R is not the	
	explanation of A.	correct explanation of A.	
	c) A is true but R is false.	d) A is false but R is true.	
26.	Assertion (A): Atomicity of oxygen is 2.		[1]
	<b>Reason (R):</b> 1 mole of an element contains 6.023 × 1	$0^{23}$ atoms.	
	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 but R is false.	d) A is false but R is true.	
27.	Assertion (A): Carbon-12 atom has been assigned an	atomic mass of exactly 12 atomic mass units.	[1]
	<b>Reason (R):</b> The atomic mass unit should be equal to	one-twelfth of the mass of a carbon-12 atom.	
	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 but R is false.	d) A is false but R is true.	
28.	Assertion (A): Atomic mass of aluminium is 27.		[1]
	<b>Reason (R):</b> An atom of aluminium is 27 times heavi	er than $\frac{1}{12}$ th of the mass of carbon-12 atom.	
	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 but R is false.	d) A is false but R is true.	
29.	Assertion (A): According to the Law of Constant Prop	ortion, in a chemical substance, elements are always	[1]
	present in a definite proportion by mass.		
	<b>Reason (R):</b> The proportion of hydrogen and oxygen is	s 1 : 8 by mass in a molecule of water.	
	a) Both A and R are true and R is the correct	b) Both A and R are true but R is not the	
	explanation of A.	correct explanation of A.	
	c) A is true but R is false.	d) A is false but R is true.	
30.	Assertion (A): Anions are larger in size than the parent	t atom.	[1]
	<b>Reason (R):</b> In an anion, the number of protons in the	nucleus is less than the number of electrons moving	
	around it.		
	a) Both A and R are true and R is the correct	b) Both A and R are true but R is not the	
	explanation of A.	correct explanation of A.	
	c) A is true but R is false.	d) A is false but R is true.	
31.	Which of the following statement is true?		[1]
	<b>Statement A:</b> Atoms can exist independently.		
	<b>Statement B:</b> The law of constant proportions is applic	cable only to pure chemical compounds.	
	a) Statement A	b) Both statement A and statement B	
	c) Neither statement A nor statement B	d) Statement B	
32.	Which of the two statement(s) is/are true?		[1]
	Statement A: Atomic mass of an element is not its actu	ual mass but relative mass.	
	<b>Statement B:</b> With the help of STM, it is possible to ta	ke the photograph of some atoms.	
	a) Both A and B	b) Statement B	
	c) Statement A	d) Neither A nor B	
	Secti	ion B	
33.	When 3.0 g of carbon is burnt in 8.0 g of oxygen, 11.0	g of carbon dioxide is formed. What mass of carbon	[2]
	dioxide will be formed when 3.0 g of carbon is burnt in	a 50.0 g of oxygen?	
34.	Hydrogen and oxygen combine in the ratio of 1:8 by m	ass to form water. What mass of oxygen gas would be	[2]
25	required to react completely with 3 g of hydrogen gas?	ocid (HNO-)	[2]
55. DC	Calculate the motal mass of (a) water $(H_2O)$ (b) mutch		[2]
36.	Calculate the mass percentage of oxygen present in the combination associated Given $H=1$ $\Omega=16$	following compounds and state the law of chemical	[2]
	(i) Water (H <sub>2</sub> O) and (ii) Hydrogen per oxide (H <sub>2</sub> O <sub>2</sub> )		
37	In a reaction 5.3 $\sigma$ of sodium carbonate reacted with 6	g of acetic acid. The products were 2.2 g of carbon	[2]
07.	dioxide. 0.9 g water and 8.2 g of sodium acetic. Show t	hat these observations are in agreement with the law of	[=]
	conservation of mass.		
	sodium carbonate + acetic acid $ ightarrow$ sodium acetic + carb	oon dioxides + water	
38.	Calculate the mass of one atom of hydrogen atom.		[2]
39.	a. Calculate the relative molecular mass of water $(H_2 G_2)$	)).	[2]
	b. Calculate the molecular mass of HNO <sub>3</sub> .		
	-		

40.	Calculate the formula mass of sodium carbonate (Na $_2$ CO $_3$ . 10 H $_2$ O).	[2]
41.	Calculate the molecular Mass of	[2]
	a. Ammonium sulphate [(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> ]	
	b. Penicillin [C <sub>16</sub> H <sub>18</sub> N <sub>2</sub> SO <sub>4</sub> ]	
	c. Paracetamol [C <sub>8</sub> H <sub>9</sub> NO]	
42.	Hydrogen and oxygen combine in the ratio 1 : 8 by mass to form water. What mass of oxygen gas would be	[2]
	required to react with 3 g hydrogen gas?	
43.	You are provided with a fine white coloured powder which is either sugar or salt. How would you identify it	[2]
	without tasting?	
44.	State the Postulates of Dalton Theory.	[2]
45.	The mass of one molecule of a substance is $4.65 imes10^{-23}$ g. What is its molecular mass? What could this	[2]
	substance be?	
46.	What are the failures of Dalton Atomic theory?	[2]
47.	Why does not the atomic mass of an element represent the actual mass of its atom?	[2]
48.	Give the chemical formulae for the following compounds and compute the ratio by mass of the combining	[2]
	elements in each one of them. (You may use appendix-III).	
	a. Ammonia	
	b. Carbon monoxide	
	c. Hydrogen chloride	
	d. Aluminium fluoride	
	e. Magnesium sulphide	
49.	How big are atoms? Explain it.	[2]
50.	Define the atomic mass unit.	[2]
51.	Give the names of the elements present in the following compounds :(a) Quick lime (b) Hydrogen bromide (c)	[2]
	Baking powder (d) Potassium sulphate	
52.	What is basic difference between atoms and molecules?	[2]
53.	Why is a cation so named?	[2]
54.	Define Valency? Find the Valency of oxygen and Aluminum.	[2]
55.	Give the formulae of the compounds formed from the following sets of elements.	[2]
	i. Calcium and fluorine	
	ii. Hydrogen and sulphur	
	iii. Nitrogen and Hydrogen	
	iv. Carbon and chlorine	
	v. Sodium and oxygen	
	vi. Carbon and oxygen	
56.	Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?	[2]
57.	What is the SI prefix for each of the following multiples and submultiples of a unit?	[2]
	a. 10 <sup>3</sup>	

- b. 10<sup>-1</sup>
- c. 10<sup>-2</sup>

	d. 10 <sup>-6</sup>	
	e. 10 <sup>-9</sup>	
	f. 10 <sup>-12</sup>	
58.	Why is it not possible to see an atom with naked eyes?	[2]
59.	Write the molecular formulae of all the compounds that can be formed by the combination of following ions:	[2]
	$\mathrm{Cu}^{2+},\mathrm{Na}^+,\mathrm{Fe}^{3+},\mathrm{Cl}^-,\mathrm{SO}_4^{2-},\mathrm{PO}_4^{3-}$	
60.	Why is not possible to see an atom with naked eye?	[2]
61.	Write the chemical formula for	[2]
	a. Calcium Phosphate	
	b. Magnesium Hydroxide	
	c. Aluminium chloride.	
62.	What is the difference between the mass of a molecule and molecular mass?	[2]
	Section C	
63.	Carbon dioxide produced by action of dilute hydrochloric acid on potassium hydrogen carbonate is moist	[3]
	whereas that produced by heating potassium hydrogen carbonate is dry. What would be the difference in the	
	composition of carbon dioxide in the two cases? State the associated law.	
64.	Write down the names of compounds represented by following formulae:	[3]
	i. $Al_2(SO_4)_3$	
	ii. CaCl <sub>2</sub>	
	iii. K <sub>2</sub> SO <sub>4</sub>	
	iv. KNO <sub>3</sub>	
	v. CaCO <sub>3</sub>	
65.	Dalton's atomic theory is contradicted by the formula of sucrose $C_{12}H_{22}O_{11}$ . Justify the statement.	[3]
	Section D	
66.	Calculate the molecular masses of H <sub>2</sub> , O <sub>2</sub> , Cl <sub>2</sub> , CO <sub>2</sub> , CH <sub>4</sub> , C <sub>2</sub> H <sub>6</sub> , C <sub>2</sub> H <sub>4</sub> , NH <sub>3</sub> , CH <sub>3</sub> OH.	[5]
67.	Find the ratio of the mass of the combining elements in the following compounds: (You may use Appendix-III)	[5]
	a. CaCO <sub>3</sub>	
	b. MgCl <sub>2</sub>	
	c. H <sub>2</sub> SO <sub>4</sub>	
	d. C <sub>2</sub> H <sub>5</sub> OH	
	e. NH <sub>3</sub>	
	f. Ca(OH) <sub>2</sub>	
68.	Calculate the formula unit masses of ZnO, Na <sub>2</sub> O, K <sub>2</sub> CO <sub>3</sub> , given atomic masses of Zn = 65 u, Na = 23 u, K = 39	[5]
	u, C = 12 u, and O = 16 u.	
69.	Fill in the blanks.	[5]
	i. In a chemical reaction, the sum of the masses of the reactants and products remains unchanged. This is called	
	ii. A group of atoms carrying a fixed charge on them is called	
	iii. The formula unit mass of $Ca_3(PO_4)$ 2 is	

- iv. The Formula of sodium carbonate is \_\_\_\_\_ and that of ammonium sulphate is \_\_\_\_\_
- 70. Calculate the molar mass of the following substances.
  - a. Ethyne, C<sub>2</sub>H<sub>2</sub>
  - b. Sulphur molecule, S<sub>8</sub>
  - c. Phosphorus molecule, P<sub>4</sub> (Atomic mass of phosphorus= 31)
  - d. Hydrochloric acid, HCl
  - e. Nitric acid, HNO<sub>3</sub>
- 71. Write the formulae for the following and calculate the molecular mass for each one of them.
  - a. Caustic potash
  - b. Baking soda
  - c. Limestone
  - d. Caustic soda
  - e. Ethanol
  - f. Common salt
- 72. i. Explain, why the number of atoms in one mole of hydrogen gas is double the number of atoms in one mole [5] of helium gas?
  - ii. Explain atomic mass unit.
  - iii. How many atoms are present in
    - a. MnO<sub>2</sub> molecule
    - b. CO molecule?
- 73. Write the chemical formulae of the following:
  - a. Magnesium chloride
  - b. Calcium oxide
  - c. Copper nitrate
  - d. Aluminium chloride
  - e. Calcium carbonate.
- 74. Give the names of the elements present in the following compounds.
  - a. Quick lime
  - b. Hydrogen bromide
  - c. Baking powder
  - d. Potassium sulphate
- 75. Write the molecular formulae for the following compounds:
  - a. Copper (II) bromide
  - b. Aluminium (III) nitrate
  - c. Calcium (II) phosphate
  - d. Iron (III) sulphide
  - e. Mercury (II) chloride
  - f. Magnesium (II) acetate

[5]

[5]

[5]

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