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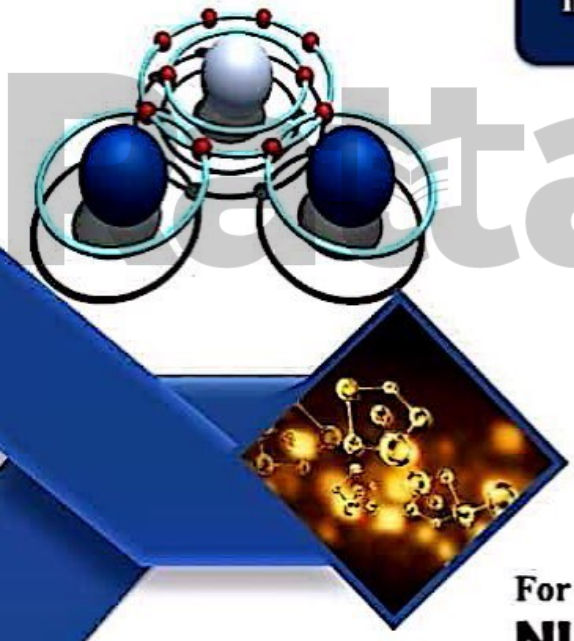

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Contents

Chap. 1 Stoichiometry

1)	Which of the following is a compound? (a) NH_3 (b) Air (c) Brass (d) O_2	A	Brass —> Alloy (Made of Cu + Zn). O2 —> Molecule
2)	Na^+ is Iso-electronic with: (a) Mg (b) He (c) Fe (d) Ne	D	Na+ = 10 ē, Ne = 10e —>Both are Iso-electronic
3)	Which of the following pairs have same electronic structure? (a) Ar & Cl^- (b) Ca & Ar (c) Mg & Na^+ (d) Ag & Sn	A	Ar &Cl^- are Iso-electronic between both have 18 e.
4)	Natural chlorine occurs as a mixture of isotopes if a mixture contains 75% Cl^{35} and 25% Cl^{37} what will be its correct atomic weight? (a) 35.50 (b) 34.50 (c) 72.00 (d) 70.00	A	Amount of $Cl^{35} = \frac{75}{100} = 0.75$, Amount of $Cl^{37} = \frac{25}{100} = 0.25$ Average atomic weight = (Amount) (At: Mass of 1st isotope) + (Amount) (At mass of 2nd isotope) = (0.75) (35) + (0.25)(37) = 26.25 + 9.25 = 35.5
5)	How many hydrogen atoms are present in one mole of water? (a) 6.02×10^{23} atoms (b) 1.806×10^{24} atoms (c) 1.204×10^{24} atoms (d) 3.01×10^{23} atoms	C	To find # ofAtom= n × N_A × # of Atom in formula = 1 × 6.02 × 10^{23} × 2 = 12.04× 10^{23} = 1.2 × 10^{24} atoms
6)	The number of oxygen in 0.5 mole of $Al_2(CO_3)_3$ is (a) 4.5×10^{23} (b) 3.6×10^{24} (c) 2.7×10^{24} (d) 9.0×10^{23}	C	#of Atoms = n × NA × # of Atoms in formula $0.5 \times 6.02 \times 10^{27} \times 9 = 27.09 \times 10^{23}$ => 2.7×10^{24} atoms
7)	A sample containing aluminum weighing 10.0g yielded 2.0g of aluminum sulphide. What is the percentage of aluminum (atomic mass = 27.0) in the sample? Sulphur (atomic mass = 32.0) (a) $\frac{2.0\times100}{10.0}$ (b) $\frac{2.0}{10}\times\frac{2\times27}{150}\times100$ (c) $\frac{2.0}{10.0}\times\frac{27}{1500}\times100$ (d) $\frac{2.0}{10.0}\times\frac{150}{3\times27}\times100$	B	Formua of Aluminum Sulphide= Al_2S_3 %age of an Element = $\frac{\text{Given Mass of Al} \times \text{Al: Mass}}{\text{Given Mass of organic Compounde}} \times \frac{\text{\# of atoms} \times \text{M .Mass of Al}}{\text{M.Mass of organic Compounde}} \times 100 = \frac{2.0}{10.0}\times\frac{2\times27}{150}\times100$
8)	Calculate the volume occupied by 2.8g of nitrogen gas at STP. (a) 22.4 dm3 (b) 2.24 dm3 (c) 4.48 dm3 (d) 44.8 dm3	B	$n = \frac{V}{Vm} \Rightarrow v = n \times Vm$ $n = \frac{m}{M} = \frac{2.8}{28} = 0.1$

$V = 0.1 \times 22.4 = 2.24\ Dm^3$

9)	How many atoms are contained in one mole of $Ca(OH)_2$ (a) $5 \times 6.02 \times 10^{23}$ atoms (b) $30 \times 6.02 \times 10^{23}$ atoms (c) $3 \times 6.02 \times 10^{23}$ atoms (d) $6 \times 6.02 \times 10^{23}$ atoms	A	# of Atoms = n × N_A × # of Atoms in formula = 1 × $6.022 \times 10^{23} \times 5$ = ($5 \times 6.02 \times 10^{23}$) Atoms
10)	A gas at STP contains only 6.023×10^{23} atoms and is monatomic it will occupy. (a) 1.2L (b) 22.4L (c) 30.5L (d) 44.8L	B	$22.4dm^3 = 22.4L = 6.023 \times 10^{23}$ atoms
11)	How many grams of waster are produced in burning $2.24dm^3$ of hydrogen at STP? (a) 180g (b) 81.g (c) 1.8g (d) 0.18g	C	$2H2 + 02 \Rightarrow 2H20$ 2 mole 1 Mole 2 Mole $n = \frac{V}{Vm} = \frac{2.24}{22.4} = 0.1 Moles$ $n = \frac{m}{M}, m = n \times M = 0.1 \times 18 = 1.8g$
12)	One mole is the amount of substance which contains as many elementary entities as contained in: (a) 0.12 kg of $_6C^{12}$ (b) 1.2 kg of $_6C^{12}$ atom (c) 0.012 kg of $_6C^{12}$ atom (d) 0.12 kg of $_8O^{16}$	C	One mole of C-12 = 12 g = (0.012 Kg)
13)	Which one of the following contains the greatest number of atoms: (a) 4g of Hydrogen (b) 4g of magnesium (c) 71 g of chlorine (d) 127g of iodine	A	For H2 = $n = \frac{m}{M} = \frac{4}{1.008} = 4$ Mole For = Mg = $n = \frac{m}{M} = \frac{4}{24} = 0.16$
14)	A sample of carbon-12 has a mass of 3.0 g. which expression gives the number of atoms in the sample? (N_A is the symbol lon the Avogadro constant. (a) $0.0030N_A$ (b) $0.25\ N_A$ (c) $3.0\ N_A$ (d) $4.0\ N_A$	B	$N = n \times N_A = n = \frac{m}{M} = \frac{3}{12} = 0.25$ $N = 0.25 \times N_A$
15)	Four moles of electrons ($4 \times 6.02 \times 10^{23}$ electrons) would electroplate how many grams of silver from a silver nitrate solution? (a) 216 (b) 324 (c) 432 (d) 540	A	$AgNO_3 \longrightarrow Ag^{+3} + NO^{-3}$ (Ag = 108) $n = \frac{m}{M}, m = n \times M$ $m = 4 \times 108 = 432$
16)	How many molecules are present in 0.20 g of Hydrogen gas? (a) $\frac{0.20}{1.008} \times 6.02 \times 10^{23}$ (b) 0.20×2.016 (c) $\frac{0.20}{2.016} \times 6.02 \times 10^{23}$ (d) $\frac{1.008}{0.70} \times 6.02 \times$	C	For number of particles = N = n × N_A $n = \frac{m}{M} = \frac{0.2}{2.016}$ $N = \frac{0.2}{2.016} \times 6.02 \times 10^{23}$

	10^{23}		
17)	1 amu is equal to 1.661×10^{-24}g, then 1.0 g will be equal to: (a) 6.022×10^{23}amu (b)6.022×10^{23}amu (c) 6.022×10^{24}amu (d)6.022×10^{24}amu	A	
18)	Calculate the number of moles of NaCl in 75.0g of table salt (a) 0.643 (b) 0.779 (c) 28.0 (d) 1.28	D	$n = \frac{m}{M} = \frac{75}{58} = 1.29$
19)	What is the number of hydrogen atoms in 5 moles of water? A) 3.0115×10^{24} B) 6.023×10^{24} C) 6.023×10^{23} D) 5.0×10^{23}	B	# of Atoms = n × N_A × # of Atoms in formula (Atomicity) = 5× $6.022 \times 10^{23} \times 2 = 6.023 \times 10^{24}$
20)	$N_2 + 3H_2 \rightleftharpoons 2NH_3$. In the above reaction the limiting reagent is: A) N_2 B) H_2 C) Ammonia D) None of the above	D	
21)	Theoretical yield is always: A) Less then practical yield. B) Greater than actual yield C) Both are equal D) None of the above	B	
22)	Which of the following is iso –electronic pair? A) Ne and Na B) Ne and Mg^{+2} C) Al and c D) Ar and Ca	B	
23)	Balance the given equation by using the suitable coefficients from the following sets: $FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$ (a) 4:11:2:8 (b) 1:10:2:8 (c) 6:5:3:7 (d) 2:11:4:8	A	
24)	Which one is experimental equation? a. Rate equation b. Rate expression c. Both a and b d. Stoichiometric equation	D	Reate equation or rate expression is experimental while stoichiometric equation is theoretical.
25)	Which statement is correct about stoichiometric calculations? a. Reactants are completely converted into products b. No side reactions take place c. Both a and b are correct d. None of these	D	25g of iodine 25g atom of oxygen = 25 x 16 = 400g 25g mole of water = 450g 25g mole of nitrogen = 700 g So, nitrogen has maximum mass
26)	Which pair of characteristics is shown by the mass spectra of propanone and propanal? MASS of Molecular ion Fragmentation a. Different Different b. Different same	C	In mass spectra fragmentation occurs which formed the molecular ion. Mass of molecular ion will be same because they are functional group isomers but their fragmentation will be different because of different functional groups.

	c. Same different d. Same Same		
27)	Which one represents a mole? a. 6.02×10^{23} atms b. 24 litres of oxygen gas at RTP c. 1g atm of Na d. All of these	D	One mole contains 6.62×10^{23} atoms/ions/molecules etc. 22.4 dm^3 at STP = 24 dm^3 at RTP.
28)	Which one of the following has maximum mass? a. 2g molecules of oxygen b. 1g mole of H_2O c. 2g atoms of nitrogen d. 1g formula of $CaCO_3$	D	2g atom of O_2 = 2 mole = 64 gram/mol 1 mole of H_2O = 18 gram/mol 2g atom of N_2 = 2 mole = 56 gram/mol 1g formula of $CaCO_3$ = 1 mole = 100 gram/mol
29)	Which one of the following contains maximum number of molecules? a. 1 mole of CH_4 b. 17g of NH_3 c. 56g of CO d. 180g of glucose	C	As 1 mole of a compound has N_A particles (molecules). Here were have two moles of CO which has maximum number of molecules = 2 x N_A
30)	Which one represents a mole? a. 1g of molecule of O_2 b. 1g atomic mas of N_2 c. 1g formula of NaCl d. All of them	D	G atom = gram molecule = g formula = mole
31)	The number of atoms present in 1 mole of H_2SO_4: a. 7 x N_A b. 8 x N_A c. N_A d. 10 x N_A	A	No of atoms = mole x atomicity x N_A = 7 N_A
32)	A unit which represent 6.023×10^{23} particles is called: a. Mole b. 1-gram ionic mass c. 1 gram molecule of nitrogen d. All of these	D	Definition of Avogrado's number
33)	How many moles of carbon atoms are present in 180g of glucose ($C_6H_{12}O_6$)? a. 6 moles b. 12 moles c. N_A moles d. 24 moles	A	180 g of glucose = 1 mole No of mole of C in $C_6H_{12}O_6$ = n x C atom in glucose = 1 mole x 6 = 6 mole
34)	How many moles are there in 60g of NaOH? a. 1.5 mol b. 2 mol c. 4 mol d. 8 mol	A	Moles in 60g of NaOH = 60g / 40 = 1.5
35)	If 15g of sulphur are burnt, what bolume of SO_2 is produced at STP? a. 10.51 dm^3 b. 20 dm^3 c. 30 dm^3 d. 100 dm^3	A	$S(1mol) + O_2(1mol) \rightarrow SO_2(1mol)$ Mole of sulphur = $\frac{15g}{32}$ = 0.468 mole 1 mole of sulpher when burnt = 1 mole of SO_2 produced X mole of sulpher when burnt = 0.462 mole of SO_2 produced X = 0.468 Now convert into volume

			Volume of SO_2 = 0.468 x 22.4 dm^3 = 10.51 dm^3
36)	The largest number of molecules are present in: a. 44g CO_2 b. 98g H_2SO_4 c. 36g H_2O d. 180g $C_6H_{12}O_6$	C	44g of CO_2 = N_A molecules 98g H_2SO_4 = N_A molecules No. of molecules in 36g of H_2O = 2 x N_A molecules Number of molecules in 180g of $C_6H_{12}O_6$ = N_A molecules
37)	Which of the following has maximum mass? a. 25g of iodine b. 25g atom of oxygen c. 25g mole of water d. 25g mole of nitrogen as	C	These are conditions for the stoichiometric calculations
38)	The Avogadro's number of atom or molecules of formula units of substance is called its: a. Molecular weight b. Molecular mass c. Mole d. None of these	C	One mole of any substance contains 6.022 x 10^{23} particles
39)	The relative atomic mass of oxygen is 16amu. What is the mass of 2 mole of oxygen gas? a. 64g b. 32g c. 100g d. 71g	A	The relative atomic mass of oxygen = 16 amu Convert into mole thus 1 mole oxygen atom = 16g/mol So, mass of 1 mole of oxygen gas = 32 g Mass of two mole of oxygen gas = 2 x 32 g = 64g
40)	From 2 moles of $KClO_3$ how many liters of O_2 can be produced at STP by decomposition of all the $KClO_3$? a. 11.2 L b. 22.4 L c. 33.6 L d. 67.2 L	D	As $2KClO_3 \rightarrow 2KCl + 3O_2$ 2 mole $KClO_3$ produce 3 mole O_2 Volume of O_2 at STP = moles x molar volume = 3 x 22.4 dm^3 = 67.2 L
41)	On heating 0.2 mole of $CaSO_4$. xH_2O loses 0.1 mole of water. What could be the formula of the compound? a. $CaSO_4$. $2H_2O$ b. $CaSO_4$. H_2O c. $CaSO_4$. ½ H_2O d. None of these	C	0.2 moles $CaSO_4$ on heating = 0.1 mole H_2O produced 1 mole $CaSO_4$ on heating = x(H_2O produced) $X = \frac{0.1 \times 1}{0.2} = 0.5$ or 1/2 Thus $CaSO_4$ ½ H_2O
42)	Which one has the maximum mass? a. 98g of H_2SO_4 b. 5g atom of iodine c. 3g molecule of SO_2 d. 2g formula of $CaCO_3$	B	98 g of H_2SO_4 5 g atom of iodine = 634.5 g 3g molecule of SO_2 = 192 g 2g formula of $CaCO_3$ = 200 g So 5 g of iodine has maximum mass
43)	The number of atoms present in 32 amu of oxygen gas: a. 2 b. 6.023 x 10^{23} c. 4 d. 8	A	1 oxygen atom = 16 amu X (oxygen atom) = 32 amu $X = \frac{32}{16}$ = 2 oxygen atom
44)	At 4°C the density of water is 1g/cm^3, what is the mass of 2dm^3 of water? a. 1000g b. 2000g c. 18g	B	1 g/cm^3 = 1000 g/dm^3 V = 2 dm3 $D = \frac{m}{v}$ => m = d x v => m = 1000 g/dm^3 x 2 dm^3 = 2000g

	d. 100g		
45)	What volume of 0.10 mol dm^{-3} aqueous silver nitrate reacts with 20cm^3 of 0.20 mol dm^{-3} barium chloride? a. 10 cm^3 b. 40 cm^3 c. 20 cm^3 d. 80 cm^3	D	As $2AgNO_3 + BaCl_2 \rightarrow 2AgCl + Ba(NO_3)_2$ $\frac{m_1 v_1}{n_1} = \frac{m_2 v_2}{n_2} \Rightarrow \frac{0.10 \times v_1}{2} = \frac{0.2 \times 20}{1} \Rightarrow V_1 = 80\ cm^3$
46)	Which one is the molar volume of the gas at STP? a. 24 dm^3 b. 22.4 dm^3 c. 80 dm^3 d. 40 dm^3	B	It has been found experimentally that one mole of any gas at STP occupies 22.4 dm^3 volume
47)	Which of the following conditions of temperature and pressure are the standard conditions (STP)? a. 0°C and 1 atm pressure b. 273 K and 14.7 psi c. 32°F and 760 Torr d. All of them	D	STP means 0°C and 1 atm pressure 273 K and 14.7 PSI, 32 °F and 760 torr, 0°C = 273 K = 32°F 1 atm = 14.7 PSI = 760 torr
48)	Which one of the following compound contains the highest percentage by mass of nitrogen? a. NH_3 b. N_2H_4 c. NO d. NH_4OH	B	% of elements $= \frac{\text{no of atoms x atomic mass of elements}}{\text{molecular mass of the compound}} \times 100$ Percentage by mass of nitrogen in $N_2H_4 = \frac{28}{32} \times 100 = 87.5\%$ Which is the highest one
49)	The molecular mass of haemoglobin is 67200 g/ mol. If 0.33% of iron is present in haemoglobin, how many iron atoms are present in one molecule of haemoglobin? a. 4 b. 3 c. 1 d. 8	A	Let x is the number of Iron atoms using the percent by mass formula we can find x $0.33 = \frac{55.85 \times x}{67200} \times 100 \Rightarrow x = 4$ number of Iron atoms
50)	DDT is an insecticide, it contains 47.39% carbon by mass, its molecular mass is 354.5 g mol^{-1}, how many carbon atoms are present in one molecule of DDT? a. 14 b. 16 c. 13 d. 18	A	% age of mass $= \frac{\text{mass of carbon x no of atoms}}{\text{molar mass of DDT}} \times 100$ No of atoms $= \frac{47.39 \times 354.5}{12 \times 100} \times 100 = 14$
51)	In the reaction, $N_2 + 3H_2 = 2NH_3$ The limiting reagent is: a. N_2 b. H_2 c. NH_3 d. None of these	D	In a balanced and reversible reaction there is no concept of limiting and excess reagent.
52)	For which one of the following the limiting reagent is applicable? a. Irreversible reaction b. Reversible reaction c. Exothermic	A	The concept of limiting and excess reagent is applicable for irreversible reaction.

d. Endothermic

53)	4 moles of sulphur reacts with 20 moles of fluorine to form sulphur hexa fluoride, the excess reagent is: a. Sulphur b. Fluorine c. Both a and b d. None of these	B	$S + 3F_2 \rightarrow SF_6$ 1 mole of S react with = 3 mole of F_2, (From balanced reaction) 4 moles of S react with = 20 moles of F_2 $\frac{\text{mole of S}}{\text{Stoichiometric Ratio}} : \frac{\text{mole of F}}{\text{Stoichiometric ratio}} \Rightarrow \frac{4}{1} : \frac{20}{3}$ 4: 6.66 SO, fluorine is excess reagent.
54)	If 49g of H_2SO_4 react with 80g of NaOH; how much reactant will be left over after the reaction is complete? a. 24.5 g H_2SO_4 b. 20g NaOH c. 40g NaOH d. 60g NaOH	C	H_2SO_4 is a limiting reagent which control the product formation. From balance equation $2NaOH + H_2SO \rightarrow Na_2SO_4 + 2H_2O$ 80g NaOH react with = 98 g of H_2SO_4 (from balance equation) Now for 49g of H_2SO_4 40g NaOH is needed out of 80g 40g of NaOH react with = 49g of H_2SO_4 So the NaOH consumed is 80g – 40g = 40g As NaOH is an excess reagent Mass of excess reagent left = total mass of excess reagent – mass consumed 80 – 40 = 40g
55)	The efficiency of a reaction can be checked by knowing: a. % yield b. Theoretical yield c. Expected yield d. All of them	A	Efficiency of a reaction can be checked by % yield.
56)	The % yield of a certain reaction is 95, the reaction is considered as: a. Excellent b. Good c. Very good d. All of them	A	Reaction that yield above 90% are considered excellent.
57)	The actual yield is always less than the theoretical yield due to a. Side reaction b. Mechanical loss c. Reversible nature d. All of them	D	Actual yield is less than theoretical yield due to i. Side reaction, ii. Mechanical loss iii. Reversible nature, and iv. Impurity
58)	Theoretical yield is always less than the actual yield because: a. Some product is lost in the experiment b. Reversible reaction may occur c. Errors are made in wighing reactant or the products d. The given statement is not correct	D	Theoretical yield is always greater than actual yield
59)	200 dm^3 of CO is burnt completely according to the reaction. $2CO + O_2 \rightarrow 2CO_2$ What volume of O_2 will be required? a. 100 dm^3 b. 50 dm^3 c. 60 dm^3 d. 70 dm^3	A	According to the balanced chemical equation 2 volumes of CO combine with one volume of O_2 to produce two volumes of CO_2 if 200dm^3 of CO is used then 100 dm^3 of O_2 will be required.

60) The pressure of vapours when sent to the ionization chamber in mass spectrometer is
(a) 10^{-5} to 10^{-6} torr (b) 10^{-6} ti 10^{-7} torr
(c) 10^{-7} to 10^{-8} torr (d) 10^{-3} to 10^{-4} torr
(b) Low pressure is maintained in te ionization chamber so that collisions of these ions may not occur.

61) 9.8 grams of aqueous solution of H_2SO_4 contains moles of H^+ ions
(b) 9.8 g H_2SO_4 = 0.1 mole H_2SO_4 1 mole H_2SO_4 produces 2 moles H^+ ions. Therefore 0.1 mole H_2SO_4produces 0.2 mole H^+

62) One mole of C_2H_5OH contains no of oxygen atoms
(a) 6.02×10^{23} (b) 3.61×10^{24}
(b) 1.81×10^{24} (d) 6.02×10^{24}
(a) 1 mole C_2H_5OH contains O = 1 mole
Therefore 1 mole oxygen atoms =6.02×10^{23} O-atoms

63) A breaker contains 9 grams of water. The number of H atoms is
(a) 6.02×10^{23} (b) 3.01×10^{23}
(c) 6.02×10^{24} (d) 3.01×10^{23}
(a) 9 grams = 0.5 mole H_2O
1 mole H_2O contains H-atoms
$= 2 \times 6.02 \times 10^{23}$
0.5 mole H_2O contains H-atoms
$= 6.02 \times 10^{23}$

64) Molecular formula is determined form empirical formulas because
(a) Molecular formula x empirical formula = n
(b) Molecular formula = n x empirical formula
(c) Molecular formula x n = empirical formula
(d) Molecular mass x empirical formula = n
(b) Molecular formula is integral multiple of empirical formula
Where $n = \frac{\text{Molecular mass}}{\text{Empirical Formula mass}}$

65) A molecule is the smallest particle of a substance because
(a) it has positive charge on it
(b) it exist independently
(c) it decomposes into ions
(d) it is always mono atomic
(b) Definition of molecule: A smallest particle of a substance which exists independently

66) Which of the following salts will have greater positive charge in its molar aqueous solution?
(a) $Ca(Cl)_2$ (b) KCl
(c) NH_4Cl (d) NaCl
(a) Ca^{++} ion is a dipositive ion while Na^+,K^+ and N^+N_4 are unipositive ions. Therefore of positive charges in 1 mole of $CaCl_2$ solution is two times.

67) Which one of the following statement is incorrect
(a) actual yield is always less than the theoretical yield
(b) the formula of compound is not definite
(c) law of conservation of mass is applied in stoichiometry
(b) Formula of a compound is definite since formula is determined from constant composition of elements in the compound.

(d) law of definite proportions is applied in stoichiometry

68) Which one of the following steps is not involved in determination of empirical formula?
(a) Determination % of each element
(b) Determination of gram atoms of each element
(c) Determination of isotopes of each element
(d) Determination of atomic ratio of elements

(c) Empirical formula is determined from the % composition of the compound. The % of each element is divided by its average atomic mass and not its isotopic mass.

69) 2.38 grams of uranium contains U-atoms
(a) 6.02×10^{22} (b) 6.02×10^{21}
(c) 3.01×10^{22} (d) 3.01×10^{21}

(b) At mass of U = 238
238 g U has no. of U-atoms=6.02×10^{23}
2.38 g U has No. of U-atoms
$= \frac{1}{100} \times 6.02 \times 10^{23} = 6.02 \times 10^{21}$

70) What is the volume in cm^3 of 3.01×10^{23} molecules of O_2 gas at S. T. P.
(a) 1000 cm^3 (b) 11000cm^3
(c)11120 cm^3 (d) 11200cm^3

(c) 6.02×10^{23} molecules of O_2 at STP
$= 22.414 dm^3 = 22414\ cm^3$
$3.01 \times 10^{23} O_2$ molecules has vol.
$= \frac{22414}{2} = 11207 cm^3$

71) The total number of covalent bonds in 4.5 grams of water is
(a) 6.02×10^{23} (b) 6.02×10^{22}
(c)3.01×10^{22} (d) 3.01×10^{23}

(d) 18g H_2O = 1 mole H_2O = 6.02×10^{23} H_2O molecules
4.5g $H_2O = \frac{4.5}{18} \times 6.02 \times 10^{23}$ H_2O molecules
$= 1.505 \times 10^{23}$
1 H_2O = 2 covalent bonds
1.505×10^{23} H_2Ohas covalent bonds
$= 2 \times 1.505 \times 10^{23} = 3.01 \times 10^{23}$

72) What is the mass of water formed when 4 grams H_2 and 64 grams of O_2 combined together
(a) 66 grams (b) 18 grams
(c) 36 grams (d) 66 grams

(c) According to reaction $2H_2 + O_2 \rightarrow 2H_2O$
Or 4g H_2 reacts with 32gO_2 to form 36g H_2O.

73) 0.5 mole of CH_4 and 0.5 mole of SO_2 gases have equal
(a) volume (b) mass is grams
(c) total number of atoms (d) Number of molecules

(d) 1 mole of any substance has 6.02×10^{23} molecules therefore 0.5 mole of different substances has no. of molecules equal.

74) Combustion analysis is performed for determining
(a) Number of ions
(b) Empirical formula of organic compound

(b) Combustion analysis is performed only for determining empirical formula of organic compounds.

(c) Structure formula
(d) Isotopes of an element

75) Each molecule of haemoglobin is 68000 times heavier than one atom of
(a) C (b) H
(c) N (d) O
(b) The size and mass of a molecule is compared with smallest sized atom i.e. H-atom

76) x-ray work has shown that the diameters of atom are of the order of
(a) 8×10^{-10} m (b) 2×10^{-10} m
(c) 8×10^{-8} m (d) 2×10^{-12} m
(b) Size of atom is of the order of 2×10^{-10}

77) The value of R(General Gas Constant) is
(a) 8.3134 JK^{-1} $mole^{-1}$ (b) 1.987 Cal K^{-1} $mole^{-1}$
(c) Both a and b (d) 1.987 JK^{-1} $mole^{-1}$
(c) In SI units the value of R
$= 8.3143\ JK^{-1}\ mole^{-1} \frac{8.3143}{4.18}$ Cal K^{-1} $mole^{-1}$
$=1.987$ Cal K^{-1} $mole^{-1}$ (1 Cal = 4.18 J)

78) The amount of matter is substance is called its
(a) Weight (b) mass
(c) Volume (d) Density
(b) Mass is defined as quality of matter in a substance

79) The standard for atomic mass is
(a) H (b) He
(c) Ne (d) C
(d) Atomic mass of en element is the mass of one atom of that elements as compared to mass of 1 atom of C, taken as 12.

80) The S.I. units for energy are
(a) J (b) Calorie
(c) K (d) Cd
(a) In S.I. U = 1Nm

81) CH_4 is the chemical formula of
(a) Ethane (b) Propane
(c) Hydrogen (d) Methane
(d) Formula of methane is CH_4 the simplest hydrocarbon.

82) H_2O_2 is the chemical formula of
(a) water (b) methane
(c) Alcohol (d) Hydrogen Peroxide
(d) Hydrogen dioxide or hydrogen peroxide has H_2O_2 formula.

83) The empirical formula of chloroform is
(a) CCl_4 (b) $CHCl_3$
(c) CH_2Cl_2 (d) CH_2O
(b) Chloroform is the trichloro methane.

84) The molecular formula and empirical formula may be
(a) Identical (b) Different
(c) Both a and b (d) None
(c) Some compounds have same empirical and molecules formula like H_2O. But some have different like benzene C_6H_6. Its empirical formula is CH.

85) The Avogadro's number is
(a) 6.0×10^{23} (b) 6.022×10^{23}
(c) 6.022×10^{23} (d) 6.002×10^{-23}
(b) Avogadro determined the number of molecules in 1 mole of the substance as 6.02×10^{23}

86) Any substance having chemically identical atoms is called
(a) Molecule (b) Element
(c) Compound (d) None

(b) An element has all atoms with same proton number.

87) One 12th the mass of C_{12} is called
(a) Atomic mass (b) A.m.u.
(c) Both a and b (d) None

(b) On carbon -12 scale, the relative atomic mass of C is 12. Therefore the unit to express the relative atomic mass (a.m.u) is $\frac{1}{12}$th x 12
= 1 a.m.u

88) Atomic weight of Ca is
(a) 20 (b) 40
(c) 45 (d) 80

(b) Ca has 2o protons and 20 neutrons in the nucleus.

89) Tobacco contains a poisonous alkaloid called Nicotine. The molecular formula of nicotine is $C_{10}H_{14}N_2$ (molar mass = 162.23 g). the mass percentage of nitrogen in nicotine, is?
a. 4.32% b. 8.23%
c. 12.4% d. 17.3%

c

90) A sample of an ionic compound contains 2.82 g Na, 4.35 g Cl, and 7.83 g O. the empirical formula of this compound is:
a. $NaClO_2$
b. $NaClO_4$
c. NaClO
d. $NaClO_4$

d

91) How many carbonate ions are there in 50g of $CaCO_3$?
a. $\frac{50}{100} \times 6.022 \times 10^{23}$
b. $\frac{100}{50} \times 6.022 \times 10^{23}$
c. $50 \times 10 \times 6.022 \times 10^{23}$
d. $\frac{50}{6.022 \times 10^{23}} \times 100$

a

Chap. 2 Atomic Structure

1)	For production of characteristic K. X-rays, the electron transition if from: A)n 3 to 2 B)n 1 to n-2 C)n 2 to no 1 D) n 2 to n-3	C	
2)	The magnetic quantum number for the last sub orbital having 3 electrons in phosphorous $^{15}{}_{31}P$ is: 2018-Eng A)-1, 0, +1 B)-1, 0,--1 C)O,-1, +2 D)-1, +1,-2	A	
3)	If the required excitation voltage is given, for which element the x-rays spectrum consists of three spectral lines i.e. K_α $k\beta$ l_α A)Na b) boron C)K D)Ca	A	
4)	Energy of electron in first excited state of Hydrogen atom in atom is. a)2,8 x 10^{-18} b)0.545 x 10^{-18} c)-2.18 x 10^{-18} d)-1312.36	B	Energy of 1st Excited state -3.4ev= $3.4 \times 1.6 \times 10^{-19}$ J/atom =-0.545x10^{-18} J/atom.
5)	Which list shows electromagnetic waves in order of increasing frequency? A) Radio waves →gamma rays→ ultraviolet → infra-red B)Radio waves→infrared →ultraviolet →gamma rays C) Ultraviolet→gamma rays→radio waves→ infrared D) Ultraviolet →infra-red→radio waves →gamma rays	B	
6)	The charge on the electron and proton is reduced to half. If the present value of Rydberg constant is R., then the new value of Rydberg constant will be A) R/2 B)R/4 C)R/8 D) R/16	C	
7)	In the discharge tube emission the cathode rays requires: a) Low potential and low prossure b) low potential and high pressure c) high potential and high pressure d) high potential and low pressure	D	
8)	Particles involves in an ordinary chemical reaction are: (a) Protons (b) Neutrons (c) Electrons (d) All of the above	C	
9)	The constancy of e/m ratio for electron shows that ;	B	

	(a) Electron mass is 1/837th of proton (b) Electrons are universal particles of all matter (c) Electrons are produced in discharge tube only (d) None of the above	
10)	The charge of electron was determined by the effect of electric field on rate of fall of oil droplets under gravity this was done by: (a) JJ Thomson (b) E Rutherford (c) R.A. Milliken (d) WC Roentgen	C
11)	Which of the following rays has the longest wavelEngth? (a) Infrared rays (b) ultraviolet rays (c) Gamma rays (d) x-rays	A
12)	The total energy of a Hydrogen atom in its ground state is: (a) zero (b) positive (c) negative (d) None	C
13)	The energy of electron in the excited state n=4 in hydrogen atom is: (a) -13.6eV (b) -3.4eV (c) -0.85eV (d) -1.5eV	C
14)	The part of electromagnetic spectrum in which Lyman series lies is: (a) Visible region (b) Infrared region (c) Ultra violet region (d) X-rays	C
15)	Which one of the following series are observed in the visible region of electromagnetic radiation. (a) Lyman series (b) Balmer series (c) Bracket series (d) Plunds series	B
16)	Transition from n = 4,5,6..... to n = 3 in hydrogen spectrum gives (a) Balmr series (b) Lyman series (c) Paschen series (d) Pfund series	C
17)	The wave nature of an electron is illustrated by its: (a) photoelectric effect (b) Compton effect (c) penetrating effect (d) diffraction	D

18) A ball of mass 1 gram is moving with a velocity of $10^{1} m - s^{-1}$. The De-broglie wavelEngth of the ball is: C
(a) $13.26 \times 10^{-36} m$ (b) $3.315 \times 10^{-34} m$
(c) $6.63 \times 10^{-34} m$ (d) $4.97 \times 10^{-36} m$

19) How many different values can m, assume in the electron sub-shell designated by quantum number n=5, l=4? D
(a) 4 (b) 5
(c) 6 (d) 9

20) The number of orbital's in 'M' shell of an atom is: D # of orbital in shell = $n^2 = (3)^2 = 9$
(a) 1 (b) 4
(c) 5 (d) 9

21) If an atom exists in the excited state n = 5, the maximum number of transition takes place is: C # of transition (spectral lines) = $\frac{n(n-1)}{2} = \frac{5(5-1)}{2} = \frac{20}{2} = 10$
(a) 6 (b) 5
(c) 10 (d) 3

22) An orbital may never be occupied by: C
(a) 1 electron (b) 2 electrons
(c) 3 electrons (d) 0 electron

23) Nitrogen has three unpaired electrons according to: A
(a) Hund's rule (b) Aulban rule
(c) Pauli's exclusion principle (d) Thumb rule

24) The atomic number of scandium is 21. What is its ground state electronic configuration? C
(a) $1s^2 2N^2 2p^6 3N^2 3p^6 3d^3$
(b) $1s^2 2N^2 2p^6 3N^2 3p^6 3d^3 4s^1$
(c) $1s^2 2N^2 2p^6 3N^2 3p^6 3d^1 4s^2$
(d) $1s^2 2N^2 2p^6 3N^2 3p^6 3d^3 4p^1$

25) The correct electronic configuration of Nickel (28) is: A
(a) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8\ 4s^2$
(b) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^7\ 4s^2\ 4p^1$
(c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^2\ 4p^2$
(d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^1\ 4p^3$

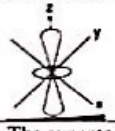
26) The electronic configuration of gallium, atomic number 31 is: A
(a) $[Ar] 4s^2\ 3d^{10}\ 4p^1$ (b) $[Ar] 3s^2\ 3d^{10}\ 4p^1$
(c) $[Kr] 3s^2\ 3d^{10}\ 4p^1$ (d)

$[Kr]4s^2\ 3d^{10}\ 4p^1$

27)	Which is incorrect about ionization energy? (a) Ionization energy Depends upon the magnitude of nuclear charge. (b) Ionization energy depends upon the atomic radius (c) Ionization energy depends upon the shielding effect. (d) Ionization energy does not depend upon the penetration effect of the inner orbital. .	D	
28)	Which of the following elements with the given electronic configuration has the highest ionization energy? (a) $1S^2\ 2S^2\ 2P^4$ (b) $1S^2\ 2S^2\ 2P^3$ (c) $1S^2\ 2S^2\ 2P^6\ 3S^1$ (d) $1S^2\ 2S^2\ 2P^6\ 3S^2\ 3P^3$	B	
29)	X-rays are widely used as a diagnostic tool in Medicine because of its (a) Particle property (b) Cost of X-ray unit is low (c) High penetrating power (d) It is not electromagnetic waves	C	
30)	What are the values of principal quantum number and azimuthal quantum number for the last electron in Chlorine atom? (a) 1.6 (b) 1.3 (c) 3.1 (d) 6.1	C	
31)	Choose atom that is not having a spin quantum number $\frac{1}{2}$. (a) C^{13} (b) N^{15} (c) F^{19} (d) O^{16}	D	
32)	The e/m of canal rays: a. Varies with the nature of gas in discharge tube b. Is independent of gas in discharge tube c. Is constant d. None of these	A	$\frac{e}{m}$ of canal says depends upon the nature of gas.
33)	Which one has maximum e/m ratio? a. Cathode ray b. Canal rays c. Beta rays d. Both a and c	A	Cathode rays are electrons and electron have smaller massthan proton or any positive ion (canal ray) thus it has maximum e/m
34)	Which one of the following has maximum e/m ratio? a. Cathode rays b. Canal rays c. X-rays d. Gama rays	A	Cathode ray are actually electrons which has very smaller mass so it has maximum e/m ratio. While Gama-rays and X-rays are electromagnetic radiatiosn having e/m ratio is zero.

35)	Which of the following is not electromagnetic in nature? a. Infrared ray b. X-rays c. Y-rays d. Cathode rays	D	Cathode ray are electron having mass and charge so it is not electromagnetic radiations.
36)	Wave mechanical model of the atom mdepends upon? a. De-Broglie's concept of duality b. Heisenberg uncertainly principle c. Schrodinger wave equation d. All of these	D	Wave model f the atoms depends on De-Broglie's concept of duality, Heisenberg uncertainly principle and Schrodinger wave equation
37)	Which electronic level in hydrogen atom will allows absorption of energy and not emission? a. 3s b. 2p c. 2s d. 1s	D	1s is the lowest electronic level, it can only absorb the energy, it cannot emit the energy because there is no other electronic level below it.
38)	The Balmer series in the spectrum of hydrogen atom fall in: a. Ultraviolet region b. Visible region c. Infrared region d. None of these	B	It is the visible region
39)	A line in Pfund series is obtained when an electron form higher energy level returns to: a. 1st orbit b. 3rd orbit c. 5th orbit d. 6th orbit	C	For pfund series $n_1 = 5$ and $n_2 = 6,7,8...$
40)	When the electron jump from 2nd 3rd, 4th orbit to the 1st then trasition is known as a. Balmer series b. Lyman series c. Pfund series d. Bracket seires	B	for Lyman series $n_1 = 1$ and $n_2 = 2,3,4,5$ ....
41)	If n = 6 the number of standing waves? a. 6 b. 8 c. 36 d. 16	A	As $n\lambda = 2\pi r \Rightarrow n = 6 \Rightarrow 6\lambda = 2\pi r$ So, the number of standing waves for n = 6 is 6.
42)	The total values of magnetic quantum number for a given value of principal quantum number (n)? a. 2l + 1 b. N^2 c. N – 1 d. N + 1	B	It is given as n^2 For 1st shell = $(1)^2 = 1 \Rightarrow$ s For 2nd shell = $(2)^2 = 4 \Rightarrow$ s, px, py, pz For 3rd shell = $(3)^2 = 9 \Rightarrow$ s, px, py, pz, dxy, dyz, dzx, dx^2y^2, dz^2
43)	The sub-shell which does not exist, has the quantum numbers: a. N = 2, l = 0 b. N = 2, l = 1 c. N = 2, l = 2 d. N = 3, l = 0	C	Because n and l can't have same values.

44)	Out of the following, which is the correct set of quantum numbers for the outermost electron of potassium atom (Z = 19)? N l m s a. 4 3 2 -1/2 b. 4 2 0 -1/2 c. 4 1 0 +1/2 d. 4 0 0 -1/2	D	For K the electronic configuration is $4s^1$ N = 1, l = 0, m = 0, s = $\frac{-1}{2}$
45)	The two electrons in the first shell will differ in the values of: a. N b. L c. M d. S	D	No two electrons in the same orbital have the same spin according to pauli exclusion's principle.
46)	Which one of the following set of quantum numbers is not allowed? a. N = 1, l = 0, m = 0, s = -1/2 b. N = 2, l = 1, m = 0, s = +1/2 c. N = 2, l = 1, m = +1, s = +1/2 d. N = 2, l = 1, m = +2, s = 0	D	N = 2, l = 1, m = +2, s = 0 2p for p orbital m should be +1, 0, -1
47)	The orbital with n = e and l = 2 is: a. 3s b. 3p c. 3d d. 3f	C	N = 3, l = 2 => 3d
48)	In which orbital electron has maximum energy? a. N = 4, l = 0, m = 0, s = + ½ b. N = 3, l = 1, m = -1, s = -1/2 c. N = 5, l = 3, m = -2, s = -1/2 d. N = 2, l = 1, m = +1, s = -1/2	a	All have same n + l values which is 5 but the n value of 3d is lower so it has the lowest energy.
49)	Which one of the following orbitals has the lowest energy? a. 3d b. 5s c. 4p d. 4f	A	According to n + l rule 4s => n + l = 4 + 0 = 4 (lowest energy level) 3d => n + l = 3 + 2 = 5 4p => n + l = 4 + 1 = 5 4d => n + l = 4 + 2 = 6
50)	Which quantum number accounts for the appearance of fine lines in hydrogen spectra? a. Subsidiary quantum number b. Secondary quantum number c. Azimuthal quantum number d. All are correct	D	Magnetic quantum number has been obtained by the solution of schrodinger's wave equation.
51)	The azimuthal quantum number l = 2 then 'm' can have values as: a. +1, -1 b. +1, 0, -1 c. +2, +1, 0, -1, -2 d. +3, +2, +1, 0, -1, -2, -3	C	l = 2 m = +1, 0, -1 = +2, +1, 0, -1, -2
52)	how many nodes are present in 3s orbital? a. 0 b. 1 c. 2 d. 3	C	=> Angular node = l For s orbital l = 0 So angular node = 0 => radial node = n – l -1 = 3 – 0 – 1 = 2 Total node = Radial node + angular node = 2 + 0 = 2

53)	How many radial nodes are present in 7s orbital? a. 6 b. 9 c. 8 d. 7	A	Use the formula to find the radial nodes = n – l – 1 = 7 – 0 – 1 = 6
54)	The orbital dz^2 consists of: a. 4 lobes b. 2 lobes c. 1 lobes d. Zero lobe	B	Dz^2 orbital has two lobes and one ring 
55)	What is the correct outer electronic configuration of Cu (Z = 29)? a. $4s^1 3d^{10}$ b. $4s^2 3d^9$ c. $4p^2 3d^9$ d. $3s^2 3d^9$	A	The expected electronic configuration is to be $4s^2\ 3d^9$ but the one s electron is shifted to 3d subshell to fill it completely because fully filled orbital is more stable than partially filled so the electronic configuration will be $4s^1\ 3d^{10}$.
56)	Orbitals having same energies are called: a. Degencerate orbitals b. Hybrid orbitals c. Valence orbitals d. D – orbitals	A	Orbital having same energies are called degenerate orbitals.
57)	Which one of the following has the same number of electrons as an alpha particle? a. H b. H^+ c. H_2 d. He	B	Alpha particle is Helium nucleus (He^{+2}) has no electron. H^+ is proton which has also no electron. So, both have zero electorns.
58)	What is the proton (atomic) number of an element that has four unpaired electrons in its ground state? a. 6 b. 14 c. 16 d. 26	D	Fe= $4s^2\ 3d^6$ (Valence shell electronic configuration) 1↓ 1↓ 1 1 1 1 $4s^2$ $3d^6$ 4-unpaired electrons
59)	Which of the following particles would, on losing an electron, have a half-filled set of P orbitals? a. C b. N c. N^{+1} d. O^{+1}	C	Electronic configuration of nitrogen $1s^2\ 2s^2\ 2p^3$ 1↓ 1 1 1 (Valence shell) In case of N^{+1} 1↓ 1↓ 1 1 By losing one electron by N^{+1} the half-filled p-orbital will be obtained.
60)	For which element does its ground state atom have no paired p electrons? a. Carbon b. Oxygen c. Neon d. Magnesium	C	In the ground state of carbon all the electrons in p orbital are unpaired. Electronic configuration of carbon (ground state) $1s^2, 2s^2, 2p^2$ 1↓ 1↓ 1 1 1s 2s 2p
61)	The electronic configuaration of $_{24}Cr$ is: a. $3d^6$ b. $3d^4\ 4s^2$	C	Expected electronic configuration of C_r is = $4s^2\ 3d^4$ (Valence shell) But to get a stability one of 4s electron is

	c. $3d^5 4s^1$ d. None of these		shifted to 3d orbital because half-filled orbital is more stable than partially filled orbital thus its electronic configuration will be $4s^1 3d^5$.
62)	Most of the alpha particles were deflected at larger angles in Rutherford experiements because of a. Positive nucleus in center b. Empty spaces in atom c. A-particle overlapping d. None	A	A-particle hav dipositive charge and nucleus have also positive charge thus nucleus repel the a-particle through various angles.
63)	What did Millkan determined in his experiment? a. Carge on electron b. Charge on electron is quantized c. Weight of charged droplets d. Both a and b	A	Millikan determined the charge on electron. He concluded that charge on each droplet is an integral multiple of the smallest charge, it means that charge is quantized.
64)	In Millikan experiment several droplets created by atomizer which droplet has the highest downward velocity a. 0.021 mg b. 0.003 mg c. 0.11 mg d. 0.032 mg	C	The downward velocity due to gravity is given as v mg so the droplet having larger mass should have highest downward velocity.
65)	Millikan's drop experiment can be perfomed with drops of a. Small size b. Large size c. Any size d. None	A	Millikan's drop experiment can be performed on small oil droplets. Larger drops have greater force of gravity, we have to apply high electric field to balance the weight of larger drop which may not be possible, so it may not be possible to perform Millikan's experiement in drop of any size.
66)	The instrument which measures the absorbance or emission of intensity and frequency is called (a) Spectrophotometer (b) Polarimeter (c) Glucometer (d) Calorimeter	(a)	The radiations emitted are seen through a spectrometer. It measures the wavelength, frequency etc. of radiations.
67)	Photons of yellow colour are energetic than violet colour (a) More (b) Less (C) Equal (d) None	(b)	The wavelength of yellow radiations region is 580 - 600 nm and that of violet is 400 430 nm. Shorter the wavelength of radiation higher is the frequency and greater is the energy.
68)	Which is the units of length (a) Angstrom (b) Poise (c) H (d) None	(a)	1 Å= 10 10 m.
69)	Balmer's series is in ----------region (a) Visible (b) U.V.	(a)	The wave numbers of the lines emitted for H-atom are 15.21 x 100 m (Ha) to 25.18 x 105 m. lie in the visible region, which are called Balmer

(C) I.R. (d) None

lines.

70) Spectrum of He is expected to be similar with
(a) H (b) Na
(c) Be (d) Lit
(d) The atomic number of He is 2 i.e. it contains two electrons. Lit also contains having two electrons (Atomic Number of Li is 3). And spectrum of an atom or ion depends upon number of electrons.

71) Magnetic quantum number represents orbital
(a) Size (b) Shape
(c) Orientations (d) Nuclear stability
(c) Magnetic quantum number tells us the number of different ways in which a given S, P, d or f-subshell can be arranged along the x, y and z-axes. These different ways are different orientations.

72) Pauli's principle is applicable to
(a) Degenerate orbitals
(b) Two electrons in the same orbital
(c) One electron
(d) None
(b) Two electrons in an orbital have opposite spins according to Pauli's Principle.

73) If l = 2 then the orbital will be ---------- orbital
(a) s (b) p
(c) d (d) f
(c) A subshell may have different shapes depending upon the value of T. When l = 2, it is a d-subshell with complicated shapes.

74) In the ground state of an atom the electron is present
(a) In the nucleus
(b) In the second shell
(c) Nearest to the nucleus
(d) (d) Farthest from the nucleus
(c) Ground state is the lowest energy state. Electron closest to the nucleus is in lowest energy state.

75) When the 6d orbital is completed the entering electron goes into
(a) 7f (b) 75
(c) 7p (d) 7d
(c) According to Auf bau principle 7p is the next subshell after filling of 6d since both have same n + l value i.e. 8.

76) The radius of first orbit of hydrogen atom
(a) 0.329Ao (b) 0.429Ao
(c) 0.529A . (d) 0.229Ao
(c) According to Boh. theory radius of an orbit

For H-atom Z=1 and $= 0.529^{\circ}A$

And radius of first orbit of H-atom

$= 0.529^{\circ}A(n^2)=0.529^{\circ}A(1)^2 = 0.529^{\circ}A$ (62)

77) The divisibility of atom was shown by
(a) Stoney (b) J.J. Thomson
(c) Millikan (d) Rutherford
(b) J.J. Thomson concluded from his experiments that all atoms contained negatively charged particles called electrons.

78) When the pressure of the gas in discharge tube is reduced, which of the following becomes more prominent
(a) Gas glows
(b) Gas ionizes
(c) A discharge takes place
(c) When the pressure inside the tube is reduced, and a high voltage 5000 - 10000 volts is applied, an electric discharge take place producing a uniform glow..

(d) Gas conducts electricity

79)	Goldstein discovered that besides the cathode rays, another type of rays are produced in the discharge tube which are called (a) Alpha ryas (b) Beta rays (c) Positive rays (d) Gamma rays	(c)	When high speed cathode rays (electrons) strike the gas molecules in the discharge tube, they knock out electrons form the gas molecules and positive ions are produced
80)	The value of Plank's constant 'h' is (a) 6.625×10^{-34} (b) 6.625×10^{-34} J sec (c) 6.625×10^{-34} KJ (d) 6.625×10^{-34} K Cal	(b)	It is a constant value
81)	The regions of the visible spectrum are (a) Threesbaden (b) Seven (c) Eight (d) Five	(b)	Violet, indigo, blue, green, yellow, orange and red radiations are the visible radiations.
82)	After performing millikan oil drop experiment in laboratory, a professor told his students that charge on 500mg of electrons must be a. -3.52×10^{7} C b. -3.52×10^{17} C c. -8.8×10^{17} C d. -8.8×10^{7} C	D	
83)	Total charge on 10 electrons is a. -1.6×10^{-20} C b. -1.6×10^{-17} C c. -3.2×10^{-19} C d. -1.6×10^{-18} C	D	
84)	If E_1, E_2 x E_3 and E_4 are the energies of electron in first, second, third and fourth shells of hydrogen atom then a. $E_2 - E_1 < E_3 - E_2 < E_4 - E_3$ b. $E_2 - E_1 > E_3 - E_2 > E_4 - E_3$ c. $E_2 - E_1 < E_3 - E_2 > E_4 - E_3$ d. $E_2 - E_1 > E_3 - E_2 < E_4 - E_3$	B	

CHAPTER 3:

THEORIES OF COVALENT BONDING AND SHAPES OF MOLECULES

1)	The bond energy of H_2 molecule ($H_2 \rightarrow$ 2H) is: A) 436 Kj/mol B) 40.7 Kj/mol C) 272 kj/mol D) 436 Avogadro's no Kj/mol	D
2)	Condidering the molecular orbital theory (MOT) choose the correct relative energies order: a) σ15 < σ*15<σ25< σ*25<σ2Px<π2Pz=πzPz b) σ15 < σ*15<σ25< σ*25<π2Py=π2Pz<π2Pzx c) σ15 < σ*15<σ25< σ*25<π2Px=π2px<σ2Py d) σ15 < σ*15<σ25< σ*25<π2py<π2pz<π2px	A
3)	Which of the following ions contain one unpaired electron? A)Zn^{+2} B)K^{+1} C)Cu^{+2} D)Na^{+1}	C
4)	According to VSEPR theory, in which of the following molecules the electron pair geometry is: A)CH_4 B)NH_3 C)BF_3 D)None of the above	B
5)	The orbital with highest energy is A)Hybrid B)Un-hybrid C)Molecular d) all are of equal energy	C
6)	The unpaired electron in the molecule of NH_3 is: A) 0 b) 1 c) 2 d)3	A
7)	What causes a sharp increase in the energy with a further decrease in the distance between atomsA and B after bond formation? (a) Attraction of atoms A and B (b) Repulsion of nuclei of A and B and electrons of A and B (c) Attraction of nucleus of A and electron of B (d) Bond formation	B

8)	During the formation of a chemical bond between two atoms the forces which are operative are: (a) Both forces of attraction and repulsion (b) Either force of attraction nor repulsion (c) Only force of attraction (d) Only force of repulsion	A	
9)	Which of the following elements with a given electronic configuration has the highest ionization potential value? (a) $1s^2 2s^2 2p^3$ (b) $1s^2 2s^2 2p^4$ (c) $1s^2 2s^2 2p^6 3s^1$ (d) $1s^2 2s^2 2p^6 3s^2 3p^3$	A	
10)	Which one will show ionic bonding? (a) NaH (b) $PbCl_4$ (c)HCl (gas) (d)PCl_3	A	
11)	The longest bond is of: (a) H – I (b) H – O (c) H – S (d) H - Cl	A	Electronegative difference $\propto \frac{1}{\text{bond length}}$
12)	Which one of the following compounds has the shortest carbon-halogen bond? (a) CH3F (b) CH_3Cl (c) CH_3Br (d) CH_3I	A	
13)	CO_2 is ISO-structural with: (a) $HgCl_2$ (b) $SnCl_2$ (c) C_2H_2 (d) NO_2	A	
14)	Oxygen molecule has two unpaired electrons. It is therefore, (a) Ferromagnetic (b) Diamagnetic (c) Electromagnetic (d) Paramagnetic	D	
15)	Which of the following hybridization can explain the shape of $BeCl_2$? (a) sp^2 hybridization (b) sp hybridization (c) sp^3 hybridization (d) dsp^2 hybridization	B	
16)	Which of the following pairs of molecules have similar geometry? (a) CO_2 and SO_2 (b) BF_3 and NH_3 (c) $MgCl_2$ and AlCl (d) CH_4 and SiH_4	D	
17)	How many sigma bonds are there in $CH_2 = CH-CH = CH_2$: (a) 6 (b) 9 (c)11 (d)4	B	
18)	The bond angle between H - C – C bond in ethane is: (a) 109.5 (b) 120	A	

(c) 90 (d) 107.5

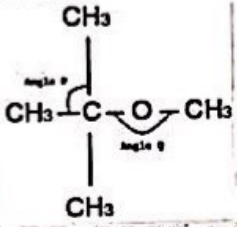
19) What type of hybrid orbits are used by the carbon atoms in C_2H_4? B
(a) sp (b) sp^2
(c) d^2sp^2 (b) sp^3

20) Species in which the central atom uses Sp hybride orbital in its bonding is:
(a) PH_3 (b) NH_3
(c) SbH_3 (d) C_2H_2

21) Bond energy of covalent bond decreases with the increase in: C
a) Polarity (b) Multiplicity
(c) Size of atom (d) All of the above

22) In the compound $^4CH_2 = {}^3CH - {}^2CH = {}^1CH_2$ C
(a) C-1 and C-2 are SP2 hybridized
(b) C-1 and C-2 are SP hybridized and C-2 and C-3 are SP2 hybridized
(c) All the carbon atoms are SP2 hybridized
(d) All the statements are wrong

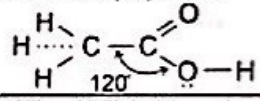
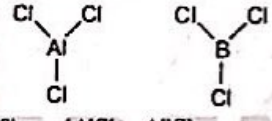
23) $NH_4^{(+)}$ and SO_4^{-2} ions have A
a. Tetrahedral geometry
b. Triangular geometry
c. Pyramidal geometry
d. Square planner geometry
Geometry of a molecule depends on the lone pair and bond pair both of them are sp^3 hybridized thus both have tetrahedral geometry.

24) MTBE is a constituent of petrol. What are the value of angle P and Q in a molecule of MTBE? C


a. Angle p = 90°, angle 0 = 105°
b. Angle p = 90°, angle 0 = 185°
c. Angle p = 109°, angle 0 = 105°
d. Angle p = 109°, angle 0 = 185°
VESPER theory is helpful in predicting the bond angles in compound like MTBE the bond angles p and q are 109° and 105° respectively.

25) Which of the following molecules is not planner? D
a. Benzene
b. Ethane
c. Boron trifluride
d. Phosphorous trichloride
PF_3 has tetrahedral geometry and its shape is trigonal pyramidal which is not planner.

26) The molecular structure of $BeCl_2$ is: A
Structure of $BeCl_2$ is linear because Be is sp

	a. Linear b. Tetrahedral c. Trigonal d. None of these		hybridized and have no lone pair Cl – Be – Cl Linear Structure
27)	What is the approximate value of the O-C-O bond angle in thanoic acid? a. 45° b. 90° c. 109° d. 120°	D	The bond angle in ethonic acid is 120° because the carbon is sp^2 hybridized. 
28)	N which one of the following pairs of molecules have similar shapes? a. $alCl_3$ and BCl_3 b. $AlCl_3$ and PCl_3 c. BF_3 and NH_3 d. $BeCl_2$ and H_2O	A	$AlCl_3$ and BCl_3 both have trigonal planner shapes because they have same hybridization that is sp^2 and no lone pair.  Shape of $AlCl_3$ and BCl_3
29)	Lateral overlapping expected in: a. Sigma bonds b. nBonds c. Ionic bonds d. Methallic bonds	B	Lateral overlapping (sidewise) is weak overlapping which results in a weaker bond called r-bond during bond formation.
30)	In the molecule CH_2= C = CH_2, the hybrid state of carbon number 2 is: a. Sp^3 b. Sp^2 c. Sp d. Dsp^3	C	The carbon number 2 in CH_2 = C = CH_2 has steric number 2. As steric number = no of attached atom to carbon + lone pair 2 + 0 = 2 so it is sp hybridized
31)	In SO_2 molecule, S atom is: a. Sp^3 hybridized b. Sp^2 hybridized c. Sp hybridized d. Dsp^2 hybridized	B	SO_2 Serie number = number of atoms attached to sulpher atom + lone pair = 2 + 1 = 3 So it is sp^2 hybridized
32)	In PCl_5 molecule the phosphorus atom is: a. Sp^3 hybridized b. Sp^3d hybridized c. Sp^3d^2 hybridized d. Sp^2 hybridized	B	For PCl_5 Steric number = attached atom to phosphorous + lone pair = 5 + 0 = 5 So hybridization of phosphorous is sp^3 d
33)	Which hybridization occurs in SO_3? a. Sp^2 b. Sp c. Dsp^2 d. Sp^3	A	Steric number helps us to determine the type of hybridization. Steric number =No. of atoms bonded to central atom + No. of lone pairs of electrons Steric number = 3 + 0 = 3 So Sulphur is SO_3 is sp^2 hybridized
34)	Which of the following compounds gives sp^3 hybridization? a. H_2O b. NH_3 c. CH_4 d. All the above	D	All these molecules have steric number 4 so they have sp^3 hybridization of central atom.
35)	In which one of the following sp^3 hybridization occurs?	D	For CH_4 Steric number = 4 so sp^3 hybridization For $KMnO_4$ as Mn is attached to four oxygen so

	a. CH_4 b. $KMnO_4$ c. H_2SO_4 d. All of them		steric number = 4 So, it is sp^3 hybridized In H_2SO_4, sulphur is attached to four oxygen, so steric number = 4 It is sp^3 hybridized.
36)	Among the following the paramagnetic is: a. NO b. NO^+ c. NO^- d. Both a & c	D	Unpaired electrons give the paramagnetic property to a molecule. Both NO and NO^- have unpaired electrons so they are paramagnetic.
37)	Oxygen molecule is paramagnetic because it has: a. Less N_b than N_a b. More N_b than N_a c. All electorns are parired d. Unpaired electrons	D	Because presence of unpaired electrons is responsible for the paramagnetic nature of a molecule. O_2 showing paramagnetic nature because it has 2 unpaired electrons.
38)	Molecular orbitals are a. Delocalized b. Localized c. Normalized d. All of these	A	Molecular orbitals which are not confined between two adjacent bonding atoms but actually extend over three or more atoms, are called delocalized molecular orbitals.
39)	Which among the species O_2^+, O_2^-, O_2 and O_2^{2-} is diamagnetic? a. O_2^+ b. O_2^- c. O_2 d. O_2^{2-}	D	All of the given species have unpair electron while O_2^{2-} has no unpair of electron so it is diamagnetic.
40)	That molecule of Ne_2 does not exist because: a. Nb > Na b. Nb = Na c. Nb > Na d. None of these	B	The Ne_2 molecule does not exist because its bond order is zero. Bond order is zero when $N_b = N_a$ as bond order = ½ ($N_b - N_a$) = ½ (2 – 2) = 0
41)	Which information is obtained from bond order? a. Stability of the molecule b. Bond dissociation energy c. Bond length d. All of them	D	Bond order a stability Bond order a $\frac{1}{\text{bond length}}$ Bond order a $\frac{1}{\text{Dissociation energy}}$
42)	If there is one electron in each atomic orbital then in bond formation: a. Electrons will go to bonding molecular orbital b. Electrons will go to antibonding molecular orbital c. One electron will go to bonding and the other to antibonding molecular orbital d. The electron will stay in their own atomic orbitals	A	Electron from atomic orbital will go to bonding molecular orbital for bond formation because bonding molecular orbital have lower energy. So electrons tend to go first in bonding molecular orbitals.
43)	The bond formed between the two helium atoms will be: a. Sigma bond b. π bond c. Helium bond d. No bond will be formed	D	no bond will be formed as He_2 bond order is zero due to equal number of electrons in bonding and anti-bonding molecular orbitals.

44) Which one contains the strongest carbon hydrogen bond?
a. Ethane
b. Ethane
c. Ethyne
d. Propane
C
The ethyne carbon is sp hybridized thus it is more electronegative and have more 's' character bond length a $\frac{1}{\text{'s' character}}$ bond length a $\frac{1}{\text{Bond strength}}$

45) The C – C bond length is maximum in
a. Ethane
b. Ethane
c. Ethyne
d. Equal in all
A
The C – C bond length is maximum in ethane as it has a weaker single covalent bond sp^3 hybridized having less 's' character as
Bond length a $\frac{1}{\text{Bond strength}}$
Bond length a $\frac{1}{\text{'s' Character}}$
So, bond length of ethane is maximum

46) Which of the following bonds required the largest amount of energy to dissociate into atoms concerned?
a. Cl – Cl bond in Cl_2
b. C – C bond in C_2H_6
c. N = N bond in N_2
d. O = O in O_2
C
Bond dissociation energy depends on
Bond dissociation energy a multiple of bond
bond dissociation energy a 1/bond length

47) If the sharing of an electron pair is unequal and the atom have an electronegativity difference of 1.4 to 1.6, what is this type of sharing called?
a. Ionic
b. Covalent
c. Polar covalent
d. Metallic
C
If the electronegative difference between 0.9 and 1.7 bond will be covalent and polar.

48) Which one of the following is the most stable molecule?
a. Thene
b. Acetylene
c. Propene
d. 1 – Butene
B
Acetylene is the stable compounds as compare to alkenes (1-butene, ethane, propene) because they are less reactive towards electrophilic reaction as compare to alkenes. The pie electron cloud of alkyne make a cylindrical electron cloud around the triple bond make it more stable.

49) The compound which contains both ionic and covalent bond is:
a. CBr_4
b. CKN
c. KCl
d. H_2
B
KCN contains both covalent and ionic bonds. There is ionic bond between K^+ and CN^- ions and covalent bond between C and N in CN^-

50) The two fluorine atoms form a bond with each other, the bond will be:
a. Sigma
b. Sigma star
c. π
d. Pi star
A
A sigma bond is formed by the overlap of two p-orbitals linearly. The covalent bond between two fluorine atoms is a sigma bond formed by the overlap of two half filled 2p orbital one from each atom of fluorine.

51) In which of the following does ionic bonding occur between the named atoms?
a. Aluminium and chlorine in the trifluoride
b. Boron and fluorine in boron trifluoride
c. Hydrogen and chlorine in hydrogen chloride
D
As the electronegativity difference between hydrogen and sodium atoms is 1.2 which is greater than 0.99 so it is ionic.

d. Hydrogen and sodium in sodium hydride

52)	Which one is the directional bonds? a. Covalent b. Coordinate covalent c. Hydrogen bonding d. All of the above	D	Covalent, co-ordinate covalent bond and hydrogen bonds are directional in nature.
53)	Which of the following molecules has a net dipole moment? (a) CO_2 (b) CS_2 (c) SO_2 (d) CCl_4	(c)	SO_2 molecule is an angular molecule with an angle less than 120°. Therefore the individual S-O bond moments cannot be cancelled out. In all other cases individual bond moments cancel each other effect giving zero dipole.
54)	Which of the following bonds is least polar? (a) H. Se (b) P Cl (c) H. Cl (d) N Cl	(d)	Polarity of a bond depends upon the difference in electronegativity of bonded atoms. ON moving across the periodic table form left to right, the electronegativity difference reduces and bond polarity reduces.
55)	During the formation of a chemical bond the potential energy of the system (a) Decreases (b) Increases (c) Does not change (d) None of these	(a)	The bond formation between the two atoms is the increase in attraction which means decrease in potential energy.
56)	In which of the following theories the hybridization is considered (a) VSEPR (b) Lewis (c) Molecule orbital (d) Valence bond	(d)	Atomic orbital hybridization gives a satisfactory explanation for valency of the elements. Valence bond theory tells the number of bonds made by atoms equal to their number of half filled orbitals. In certain cases the number of half filled orbitals for bond making is due to excitation of electrons. Excitation causes hybridization.
57)	The bond order for Hez molecule is (a) zero (b) 1/2 (c) 1 : (d) 2	(a)	Bond order= $\frac{\text{No.of electron in bondingmolecular orbitals} - \text{No.of electrons in antibonding M-O}}{2}$ For He_2 the bond order $= \frac{2-2}{2} = \frac{\text{zero}}{2} = \text{zero}$
58)	The bond order O, molecule is (a) 1 (b) 2 (c) 3 (d) zero	(b)	The bond order of O_2 (No. of electrons in B.M.O. – No. of electrons in B.M.O.)/2 $= \frac{6-4}{2} = \frac{4}{2} = 2$.
59)	The C- Cbond length in ethane (C2H6) is (a) 154 pm (b) 133 pm (c) 120 pm (d) 105 pm	(a)	In C_2H_6 there is C—C single bond. And C—C single bond length is always 154 Pm.
60)	The C = C bond length in ethene (C_2H_4) is (a) 154 pm (b) 133 pm (c) 120 pm (d) 105 pm	(b)	In C_2H_4 there is C = C double bond and its length is 133pm.
61)	The C=C bond length in ethyne is (a) 154 pm (b) 133 pm (c) 120 pm (d) 105 pm	(c)	The bond length when there is triple bond between two C-atoms is always 120pm.

62) The bond between H – H is
(a) Stronger than the bond between H — Cl
(b) Weaker than the bond between H — Cl
(c) Neither stronger nor weaker than the bond between H —Cl
(d) None of these

(a) H-atoms are small sized and are closer than H and Cl atoms in H —Cl.

63) One of the causes of reactions is that the systerms attains the energy state which is of
(a) Higher in energy
(b) Lower in energy
(c) Balanced in energy
(d) Equal in energy

(b) The bonds formed in the products are stronger i.e. stable bonds. These stable bonds are due to greater attractions which lower energy of the products.

64) The polarity of molecule is expressed by
(a) Bond strength
(b) Dipole moment
(c) Bond length
(d) Shape

(b) dipole moment is the vectorial sum of the individual bond moments in a molecule. Dipole moment of a molecule means that there is a net positive pole and a negative pole in the molecule.

65) The electro-negatively difference for ionic bond must be greater than
(a) 1.6 (b) 1.7
(c) 1.8 (d) 1.0

(b) In this case more than 50% the bond is ionic.

66) The VSEPER theory explains the _____ of molecules
(a) Number (b) Kinds
(c) Geometry (d) None

(c) Sidgwick and powell pointed out that the shapes of molecules could be represented by the number of electron pairs in the outer orbit of the central atom. These pairs are arranged at maximum distance apart given a definite shape to the molecule.

67) The electro-negativity difference of H—Cl is 0.9 so it should be _____ bond
(a) Covalent (b) Ionic
(c) Coordinate covalent
(d) Metallic

(a) The electronegativity difference is less than 1.7, hence the bond is covalent, but partically ionic i.e. polar.

68) If two lone pairs are present then bond angle of tetrahedral compound reduces to _____ degrees
(a) 109.5° (b) 107.5°
(c) 104.5° (d) None

(c) The lone-pair lone pair repulsion is greater due to which the bond angle 109.5 (normal tetrahedral angle) contracts to 104.5°

69) The energy of the non-bonding molecular orbital is _____ than bonding molecular orbital
(a) lesser (b) Great
(c) Equal (d) None

(b) Non-bonding molecular orbital is away from the nuclei. There is greater nucleus-nucleus repulsion which causes greater energy then that of bonding molecular orbital.

70) A covalent bond may be
(a) 100% covalent
(b) Partially ionic

(d) Covalent bond between two like atoms is 100% covalent whereas the covalent ond between two unlike atoms is partially ionic covalentond.

(c) 100% ionic
(d) Both a and b

71)	The properties of a substance aare determined in a party by (a) Ionic bond (b) covalent bond (c) Hydrogen bond (d) Chemical bond	(d)	The nature of chemical bond will tell us what kind of reaction are represented by that compound ionic bond present in the compound will give fast reactions of that substance.
72)	Formation of MgO is an example of (a) ionic bond (b) Covalent bond (c) polar bond (d) double covalent bond	(a)	The electronegativity difference between Mg and O is 2.3 which is greater than 1.7, hence the bond is ionic.
73)	The inter-nuclear distance are at which the energy of the two atoms bonded together is minimum as compared to the isolated atoms is called (a) Equilibrium bond distance (b) Bond length (c) Both a and b (d) None	(c)	When the two atoms approach distance of minimum energy, then the two atoms form a stable system and the distance between them is the compromise distance or bond length.
74)	Elements of group I and II combined with the elements of group Vi and VII to form (a) Ionic bond (b) Covalent bond (c) Polar bond (d) Polar covalent bond	(a)	I, II group elements have low ionization energies and Vi, VII group elements have high electrons affinities. The bond between them is ionic bond.
75)	The ionic bonds are (a) Unidirectional (b) Bi-directional (c) Non-directional (d) Multi-directional	(c)	The electrostatic force of attraction of a cation by oppositely charged ions is in all directions therefore ionic bond is in all directions or non-directional.
76)	The bond pair electrons remain between two nuclei and are called _____ electrons (a) Valance (b) Stable (c) Localized (d) None	(c)	The bond pair electrons are concentrated in the region between the two nuclei. Such pair is localized.
77)	The covalent compounds in non-polar solvents are _____ conductors of electricity (a) Good (b) Bad (c) Poor (d) Excellent	(b)	The these solutions carry no electric charge i.e. there are electrically neutral.
78)	The covalent bonds are (a) Unidirectional (b) Bi-directional (c) Non-directional (d) Multi-directional	(d)	A polyvalent atom makes the covalent bond in different directions e.g. C in CH_4 makes 4 covalents in tetrahedral manner.
79)	The degree of polarity of molecule is known as its (a) Dipole moment (b) Moment arm (c) Bond energy (d) Ionic character	(a)	Dipole moment ($u = q \times r$) measures the strength of positive and negative poles in a molecule.