DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 02

SYLLABUS : Basic Concepts of Chemistry 2 (Mole Concept)

Max. Marks : 120 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 How many carbon atoms are present in 0.35 mol of $C_6H_{12}O_6$?

(a) 6.023×10^{23} carbon atoms

(b) 1.26×10^{23} carbon atoms

(c) 1.26×10^{24} carbon atoms

(d) 6.023×10^{24} carbon atoms

Q. 2 How many molecules are present in 5.23 gm of glucose ($C_6H_{12}O_6$)?

(a) 1.65×10^{22} (b) 1.75×10^{22}

(c) 1.75×10^{21} (d) None of these

Q.3 What is the weight of 3.01×10^{23} molecules of ammonia?

(a) 17 gm (b) 8.5 gm

(c) 34 gm (d) None of these

Q.4 8 litre of H_2 and 6 litre of Cl_2 are allowed to react to maximum possible extent. Find out the final volume of reaction mixture. Suppose P and T remains constant throughout the course of reaction :

(a) 7 litre (b) 14 litre

(c) 2 litre (d) None of these

Q. 5 Naturally occurring chlorine is 75.53% Cl^{35} which has an atomic mass of 34.969 amu and 24.47% Cl^{37} which has a mass of 36.966 amu. Calculate the average atomic mass of chlorine-

(a) 35.5 amu (b) 36.5 amu

(c) 71 amu (d) 72amu

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

Q. 6 Calculate the mass in gm of 2g atom of Mg-
(a) 12 gm (b) 24 gm
(c) 6 gm (d) None of these

Q. 7 In 5 g atom of Ag (At. wt. of Ag = 108), calculate the weight of one atom of Ag -
(a) 17.93×10^{-23} gm (b) 16.93×10^{-23} gm
(c) 17.93×10^{23} gm (d) 36×10^{-23} gm

Q.8 A compound possesses 8% sulphur by mass. The least molecular mass is
(a) 200 (b) 400 (c) 155 (d) 355

Q.9 Calculate the mass in gm of $2N_A$ molecules of CO_2 -
(a) 22 gm (b) 44 gm
(c) 88 gm (d) None of these

Q.10 In a mole of water vapour at STP, the volume actually occupied or taken by the molecules (i.e., Avogadro's No. × Volume of one molecule) is
(a) zero
(b) less than 1% of 22.4 litres
(c) about 10% of the volume of container
(d) between 1% to 2% of 22.4 litres

Q.11 How many molecules are present in one ml of water vapours at STP?
(a) 1.69×10^{19} (b) 2.69×10^{-19}
(c) 1.69×10^{-19} (d) 2.69×10^{19}

Q.12 How many years it would take to spend Avogadro's number of rupees at the rate of 1 million rupees in one second?
(a) 19.098×10^{19} years (b) 19.098 years
(c) 19.098×10^{9} years (d) None of these

Q.13 An atom of an element weighs 6.644×10^{-23} g. Calculate g atoms of element in 40 kg-
(a) 10 gm atom (b) 100 gm atom
(c) 1000 gm atom (d) 10^4 gm atom

Q.14 Calculate the number of Cl^- and Ca^{+2} ions in 222 g anhydrous $CaCl_2$ –
(a) $2N_A$ ions of Ca^{2+} & $4N_A$ ions of Cl^-
(b) $2N_A$ ions of Cl^- & $4N_A$ ions of Ca^{2+}
(c) $1N_A$ ions of Ca^{2+} & $1N_A$ ions of Cl^-
(d) None of these

Q.15 Calculate the weight of lime (CaO) obtained by heating 200 kg of 95% pure lime stone ($CaCO_3$).
(a) 104.4 kg (b) 105.4 kg (c) 212.8 kg (d) 106.4 kg

Q.16 The chloride of a metal has the formula MCl_3. The formula of its phosphate will be-
(a) M_2PO_4 (b) MPO_4 (c) M_3PO_4 (d) $M(PO_4)_2$

Q.17 A silver coin weighing 11.34 g was dissolved in nitric acid. When sodium chloride was added to the solution all the silver (present as $AgNO_3$) was precipitated as silver chloride. The weight of the precipitated silver chloride was 14.35 g. Calculate the percentage of silver in the coin -
(a) 4.8 % (b) 95.2% (c) 90 % (d) 80%

Q.18 Phosgene, a poisonous gas used during World War-I, contains 12.1% C, 16.2% O and 71.7% Cl by mass. What is the empirical formula of phosgene?
(a) $COCl_2$ (b) CO_2Cl_2
(c) COCl (d) None of these

Q.19 What volume of hydrogen gas, at 273 K and 1 atm pressure, will be consumed in obtaining 21.6 g of elemental boron (atomic mass =10.8) from the reduction of boron trichloride by hydrogen?
(a) 22.4L (b) 89.6L (c) 67.2L (d) 44.8L

Q.20 Which of the following will weigh maximum amount?
(a) 40 g iron
(b) 1.2 g atom of N
(c) 1×10^{23} atoms of carbon
(d) 1.12 litre of O_2 at STP

RESPONSE GRID					
	6. (a)(b)(c)(d)	7. (a)(b)(c)(d)	8. (a)(b)(c)(d)	9. (a)(b)(c)(d)	10. (a)(b)(c)(d)
	11. (a)(b)(c)(d)	12. (a)(b)(c)(d)	13. (a)(b)(c)(d)	14. (a)(b)(c)(d)	15. (a)(b)(c)(d)
	16. (a)(b)(c)(d)	17. (a)(b)(c)(d)	18. (a)(b)(c)(d)	19. (a)(b)(c)(d)	20. (a)(b)(c)(d)

Space for Rough Work

Q.21 How many moles of potassium chlorate to be heated to produce 11.2 litre oxygen?

(a) $\frac{1}{2}$ mol (b) $\frac{1}{3}$ mol (c) $\frac{1}{4}$ mol (d) $\frac{2}{3}$ mol

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes :

(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct

(c) 2 and 4 are correct **(d)** 1 and 3 are correct

Q.22 5.325g sample of methyl benzoate, a compound used in the manufacture of perfumes is found to contain 3.758 g of carbon, 0.316g hydrogen and 1.251g of oxygen. . If mol. weight of methyl benzoate is 136.0

Choose the correct options –

(1) Empirical formula of compound is C_4H_4O

(2) Molecular formula of compound is $C_8H_8O_2$

(3) Empirical formula of compound is $C_8H_8O_2$

(4) Molecular formula of compound is C_4H_4O

Q.23 Choose the correct statements –

(1) The number of atoms in 52 mole of He is 31.3×10^{24}

(2) The number of atoms in 52 amu of He is 13

(3) The number of atoms in 52g of He is 78.26×10^{23}

(4) The number of atoms in 52g of He is 52.26×10^{23}

Q.24 Choose the correct statements –

(1) The number of atoms in 1g of helium is 1.506×10^{22}

(2) The mass of 1 molecule of CO is 4.65×10^{-23} g

(3) The volume at STP occupied by 240gm of SO_2 is 22.4 litre

(4) The volume at STP occupied by 240gm of SO_2 is 84 litre

DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :

Representation of the chemical change in terms of symbol and formulae of the reactants & products is called a chemical equation.

Information conveyed by a chemical equation

(1) Qualitatively, a chemical equation tells us the names of the various reactants

(2) Quantitatively, it expresses

(a) The relative no. of molecules of reactants and products

(b) The relative no. of moles of reactants and products

(c) The relative masses of reactants and products

(d) The relative volumes of gaseous reactants and products

Limiting Reagent : The reactant which is completely consumed during the reaction is called limiting reagent-

Q.25 Calculate the mass of oxygen required to burn 14g C_2H_4 completely-

(a) 48g (b) 54 g (c) 36 g (d) 78 g

Q.26 Calculate the volume of H_2 at STP that will be displaced by 1 g of Zn when it is completely dissolved in dilute sulphuric acid.

(a) 0.1425 dm^3 (b) 2.3425 dm^3

(c) 0.3425 dm^3 (d) 1.3425 dm^3

Q.27 10 ml of liquid carbon disulphide (sp. gravity 2.63) is burnt in oxygen. Find the volume of the resulting gases measured at STP.

(a) 13.26 lit. (b) 23.26lit.

(c) 33.26 lit. (d) 43.26lit.

RESPONSE GRID					
	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ
	26. ⓐⓑⓒⓓ	27. ⓐⓑⓒⓓ			

Space for Rough Work

DIRECTIONS (Q.28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.

(c) Statement -1 is False, Statement-2 is True.

(d) Statement -1 is True, Statement-2 is False.

Q.28 Statement 1 : One mole of SO_2 contains double the number of molecules present in one mole of O_2.

Statement 2 : Molecular weight of SO_2 is double to that of O_2.

Q.29 Statement 1 : The ratio by volume of gaseous reactants and products is in agreement with their molar ratio.

Statement 2 : Volume of a gas is inversely proportional to the number of moles of a gas.

Q.30 Statement 1 : 1 amu equals to 1.99×10^{-23} g

Statement 2 : 1.99×10^{-23} g equals to $\frac{1}{12}$ th of mass of a C^{12} atom.

RESPONSE GRID	28. ⓐ ⓑ ⓒ ⓓ	29. ⓐ ⓑ ⓒ ⓓ	30. ⓐ ⓑ ⓒ ⓓ

DAILY PRACTICE PROBLEM SHEET 2 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	32	Qualifying Score	48
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

02

(1) (c) 1 mol of $C_6H_{12}O_6$ has $= 6\ N_A$ atoms of C

$\therefore$ 0.35 mol of $C_6H_{12}O_6$ has

$= 6 \times 0.35\ N_A$ atoms of C

$= 2.1\ N_A$ atoms

$= 2.1 \times 6.023 \times 10^{23} = 1.26 \times 10^{24}$ carbon atoms

(2) (b) $\because$ 180 gm glucose has $= N_A$ molecules

$\therefore$ 5.23 gm glucose has $= \dfrac{5.23 \times 6.023 \times 10^{23}}{180}$

$= 1.75 \times 10^{22}$ molecules

(3) (b) $\because$ 6.023×10^{23} molecules of NH_3 has weight = 17 gm

$\therefore$ 3.01×10^{23} molecules of NH_3 has weight

$= \dfrac{17 \times 3.01 \times 10^{23}}{6.023 \times 10^{23}} = 8.5$ gm

(4) (b)

	H_2 +	Cl_2	$\rightarrow 2HCl$
Volume before reaction	8 lit	6 lit	0
Volume after reaction	2	0	12

$\therefore$ Volume after reaction

= Volume of H_2 left + Volume of HCl formed

$= 2 + 12 = 14$ lit

(5) (a) Average atomic mass

$$= \frac{\%\text{ of I isotope} \times \text{its atomic mass} + \%\text{ of II isotope} \times \text{its atomic mass}}{100}$$

$$= \frac{75.53 \times 34.969 + 24.47 \times 36.966}{100} = 35.5\ \text{amu}.$$

(6) (d) $\because$ 1 gm atom of Mg has mass = 24 gm

$\therefore$ 2 gm atom of Mg has mass $= 24 \times 2 = 48$ gm.

(7) (a) $\because$ N_A atoms of Ag weigh 108 gm

$\therefore$ 1 atom of Ag weigh

$= \dfrac{108}{N_A} = \dfrac{108}{6.023 \times 10^{23}} = 17.93 \times 10^{-23}$ gm.

(8) (b) $\because$ 8gm sulphur is present in 100gm of substance

$\therefore$ 32gm sulphur will present $= \dfrac{100}{8} \times 32 = 400$

(9) (c) $\because$ N_A molecules of CO_2 has molecular mass = 44

$\therefore$ $2N_A$ molecules of CO_2 has molecular mass

$= 44 \times 2 = 88$ gm.

(10) (b) It is about 22.4L.

(11) (d) $\because$ 22.4 litre water vapour at STP has

$= 6.023 \times 10^{23}$ molecules

$\therefore$ 1×10^{-3} litre water vapours at STP has

$= \dfrac{6.023 \times 10^{23}}{22.4} \times 10^{-3} = 2.69 \times 10^{19}$

(12) (c) $\because$ 1 million or 10^6 rupees are spent in 1sec.

$\therefore$ 6.023×10^{23} rupees are spent in

$= \dfrac{1 \times 6.023 \times 10^{23}}{10^6}$ sec

$= \dfrac{1 \times 6.023 \times 10^{23}}{10^6 \times 60 \times 60 \times 24 \times 365}$ years $= 19.098 \times 10^9$ year

(13) (c) $\because$ Weight of 1 atom of element $= 6.644 \times 10^{-23}$ gm

$\therefore$ Weight of N_A atoms of element

$= 6.644 \times 10^{-23} \times 6.023 \times 10^{23} = 40$ gm

$\because$ 40gm of element has 1 gmatom.

$\therefore$ 40×10^3 gm of element has $\dfrac{40 \times 10^3}{40}$

$= 10^3$ gm atom.

(14) (a) $\because$ Mol. wt. of $CaCl_2 = 111$ g

$\because$ 111 g $CaCl_2$ has $= N_A$ ions of Ca^{2+}

$\therefore$ 222g of $CaCl_2$ has $\dfrac{N_A \times 222}{111} = 2N_A$ ions of Ca^{2+}

Also $\because$ 111 g $CaCl_2$ has $= 2N_A$ ions of Cl^-

$\therefore$ 222 g $CaCl_2$ has $= \dfrac{2N_A \times 222}{111}$ ions of Cl^-

$= 4N_A$ ions of Cl^-.

(15) (d) $\because$ 100kg impure sample has pure $CaCO_3 = 95$kg

$\therefore$ 200 kg impure sample has pure $CaCO_3$

$= \dfrac{95 \times 200}{100} = 190$kg.

$CaCO_3 \rightarrow CaO + CO_2$

$\because$ 100 kg $CaCO_3$ gives $CaO = 56$ kg.

$\therefore$ 190 kg $CaCO_3$ gives $CaO = \dfrac{56 \times 190}{100} = 106.4$ kg.

(16) (b) MPO_4 since M has +3 valency.

(17) (b) $Ag + 2HNO_3 \rightarrow AgNO_3 + NO_2 + H_2O$

108

$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

143.5

$\therefore$ 143.5 gm of silver chloride would be precipitated by 108 g of silver.

or 14.35 g of silver chloride would be precipitated by 10.8 g of silver.

Hence 11.34 g of silver coin contain 10.8 g of pure silver.

$\therefore$ 100 g of silver coin contain $\dfrac{10.8}{11.34} \times 100 = 95.2\%$.

(18) (a)

Element	%	Mole ratio	Simplest mole ratio
C	12.1	$\frac{12.1}{12} = 1.01$	$\frac{1.01}{1.01} = 1$
O	16.2	$\frac{16.2}{16} = 1.01$	$\frac{1.01}{1.01} = 1$
Cl	71.7	$\frac{71.7}{35.5} = 2.02$	$\frac{2.02}{1.01} = 2$

Hence empirical formula $= COCl_2$

(19) (c) $BCl_3 + 3[H] \rightarrow B + 3HCl$

$BCl_3 + \frac{3}{2}H_2 \rightarrow B + 3HCl$

$\frac{3}{2}$ mole 1 mole

No. of moles of B obtained $= \frac{\text{Wt. of B}}{\text{At. mass of B}}$

$= \frac{21.6}{10.8} = 2$

Thus 1 mole B $= \frac{3}{2}$ mole of H_2

2 mole B = 3 mole of H_2

$= 3 \times 22.4$ L of $H_2 = 67.2$ L of H_2

(20) (a)

(a) Mass of iron = 40 g

(b) Mass of 1.2 g atom of N $= 14 \times 1.2 = 16.8$ gm

(c) Mass of 1×10^{23} atoms of C $= \frac{12 \times 1 \times 10^{23}}{6.023 \times 10^{23}} = 1.99$ gm.

(d) Mass of 1.12 litre of O_2 at STP $= \frac{32 \times 1.12}{22.4} = 1.6$ g

(21) (b) $2KClO_3 \rightarrow 2KCl + 3O_2$

Mole for reaction 2 2 3

$\because$ 3×22.4 litre O_2 is formed by 2 mole $KClO_3$

$\therefore$ 11.2 litre O_2 is formed by $= \frac{2 \times 11.2}{3 \times 22.4} = \frac{1}{3}$

(22) (b)

Element	%	Mole ratio	Simplest whole ratio
C	$\frac{3.758 \times 100}{5.325} = 70.57$	$\frac{70.57}{12} = 5.88$	$\frac{5.88}{1.47} = 4$
H	$\frac{0.316 \times 100}{5.325} = 5.93$	$\frac{5.93}{1} = 5.93$	$\frac{5.93}{1.47} = 4$
O	$\frac{1.251 \times 100}{5.325} = 23.50$	$\frac{23.50}{16} = 1.47$	$\frac{1.47}{1.47} = 1$

$\therefore$ Empirical formula $= C_4H_4O$

$n = \frac{\text{Mol. wt}}{\text{Empirical formula wt.}} = \frac{136}{68} = 2$

$\Rightarrow$ Molecular formula $= C_8H_8O_2$

(23) (a)

(1) 1 mole of He contains 6.02×10^{23} atoms

$\therefore$ 52 moles of He contain $= 52 \times 6.02 \times 10^{23}$

$= 31.3 \times 10^{24}$ atoms

(2) Atomic weight of He = 4 amu

$\therefore$ 52 amu of He contain $= \frac{52}{4} = 13$ atoms of He

(3) Number of moles of He in 52g $= \frac{52}{4} = 13$ moles

$\therefore$ no. of atoms in 52g of He i.e. 13 moles

$= 13 \times 6.02 \times 10^{23}$ atoms

$= 78.26 \times 10^{23}$ atoms

(24) (c)

(1) 4g of Helium contains 6.023×10^{23} atoms

1g of Helium contains $= \frac{6.023 \times 10^{23}}{4}$

$= 1.506 \times 10^{23}$ atoms

(2) Gram molecular weight of CO $= 12 + 16 = 28$g

6.023×10^{23} molecules of CO weigh 28gm

1 molecule of CO weighs $= \frac{28}{6.023 \times 10^{23}}$

$= 4.65 \times 10^{-23}$ g

(3, 4) Molecular weight of $SO_2 = 32 + 2 \times 16 = 64$

64 gm of SO_2 occupies 22.4 litre at STP

240 gm of SO_2 occupies $= \frac{22.4}{64} \times 240 = 84$ litre at STP

(25) (a) $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$

Mole ratio 1 3 2 2

Moles of C_2H_4 to be burnt $= \frac{14}{28} = \frac{1}{2}$ mole

$\because$ 1 mole C_2H_4 requires 3 mole O_2 for combustion

$\therefore$ $\frac{1}{2}$ mole C_2H_4 requires $3 \times \frac{1}{2} = \frac{3}{2}$ mole O_2

Thus mass of $O_2 = \frac{3}{2} \times 32 = 48$ gm

(26) (c) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

1 atom 1 molecule 1 molecule 1 molecule

1 gram-atom 1 mole

65.4 g 2 gm or 22.4 dm^3

$\because$ 65.4 g of Zn displaces 22.4 dm^3 of H_2 at S.T.P.

$\therefore$ 1.0 g of Zn displaces $\frac{22.4}{65.4} \times 1.0 = 0.3425$ dm^3

(27) (b) 1 ml of CS_2 weighs 2.63 g

10 ml of CS_2 weighs 26.3 g

$CS_2 + 3O_2 \rightarrow CO_2 + 2SO_2$

12 + (2 × 32) 22.4 ℓ 44.8 ℓ

76 gm 67.2 ℓ

$\because$ 76g of CS_2 yield 67.2 ℓ of a mixture of CO_2 and SO_2 at STP

$\therefore$ 26.3 g of CS_2 would yield $\frac{67.2}{76} \times 26.3 = 23.26$ lit.

(28) (c) One mole of SO_2 and O_2 have same number of molecules.

(29) (d) $V \propto n$ at same temperature and pressure.

(30) (a) 6.023×10^{23} atoms of C are present in 12 gm of C-12

$\therefore$ 1 atom of C weighs $= \frac{12}{6.023 \times 10^{23}} = 1.99 \times 10^{-23}$ gm