DPP - Daily Practice Problems

Name : Date :

Start Time : End Time :

CHEMISTRY 01

SYLLABUS : Basic Concepts of Chemistry 1 (Equivalent Concept) : Physical quantities and their measurements in chemistry, Significant figures, Laws of chemical combination, Concentration terms, Equivalent weight

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 In acting as a reducing agent, a piece of metal M weighing 16 grams gives up 2.25×10^{23} electrons. What is the equivalent weight of the metal ?

(a) 42.83 (b) 21.33 (c) 83.32 (d) 32

Q.2 Zinc sulphate contains 22.65% of zinc and 43.9% of water of crystallization. If the law of constant proportions is true, then the weight of zinc required to produce 20 g of the zinc sulphate crystals will be

(a) 45.3 g (b) 4.53 g (c) 0.453 g (d) 453 g

Q.3 What weight of HNO_3 is needed to convert 62 gm of P_4 to H_3PO_4 in the reaction ?

$$P_4 + 3HNO_3 \longrightarrow H_3PO_4 + NO_2 + H_2O$$

(a) 63gm (b) 630gm (c) 315gm (d) 126gm

Q.4 The density of O_2 at NTP is 1.429g / litre. Calculate the standard molar volume of the gas.

(a) 22.4 lit. (b) 11.2lit

(c) 33.6lit (d) 5.6 lit.

Q.5 6.90 gm of a metal carbonate were dissolved in 60 ml of 2(N) HCl. The excess acid was neutralized by 20 ml of 1(N) NaOH. What is the equivalent wt. of the metal ?

(a) 40 (b) 20 (c) 19 (d) 39

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

Space for Rough Work

Q.6 10 ml of $\left(\frac{N}{2}\right)$ HCl, 30 ml of $\left(\frac{N}{10}\right)$ HNO_3 and 75 ml of $\left(\frac{N}{5}\right)$ HNO_3 are mixed, the normality of H^+ in the resulting solution is-

(a) 0.2 (b) 0.1 (c) 0.5 (d) 0.25

Q.7 How many significant figure are in each of the following numbers?

(1) 4.003 (2) 6.023×10^{23} (3) 5000

(a) 3,4, 1 (b) 4,3,2 (c) 4,4,4 (d) 3,4,3

Q.8 In the final answer of the expression $\frac{(29.2-20.2)(1.79\times10^5)}{1.37}$.

The number of significant figures is

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

Q.9 Two elements X and Y have atomic weights of 14 and 16. They form a series of compounds A, B, C, D and E in which the same amount of element X, Y is present in the ratio 1 : 2 : 3 : 4 : 5. If the compound A has 28 parts by weight of X and 16 parts by weight of Y, then the compound of C will have 28 parts weight of X and

(a) 32 parts by weight of Y (b) 48 parts by weight of Y

(c) 64 parts by weight of Y (d) 80 parts by weight of Y

Q.10 What volume of oxygen gas (O_2) measured at 0°C and 1 atm, is needed to burn completely 1L of propane gas (C_3H_8) measured under the same conditions ?

(a) 7L (b) 6L (c) 5L (d) 10L

Q.11 What is the equivalent weight of HNO_3 in the following reaction ?

$HNO_3 + H_2S \longrightarrow H_2O + NO + S$

(a) 21 (b) 11.5

(c) 33 (d) None of these

Q.12 What is the equivalent weight of ClO_3^- in the following reaction ?

$ClO_3^- + Fe^{2+} + H^+ \longrightarrow Cl^- + Fe^{3+} + H_2O$

(a) 23.9167 (b) 33.9167

(c) 13.9167 (d) 43.9167

Q.13 A sample was weighted using two different balances. The results were (i) 3.929 g (ii) 4.0 g. How would the weight of the sample be reported?

(a) 3.929 g (b) 3 g

(c) 3.9 g (d) 3.93 g

Q.14 In the given set of reactions what is the ratio of equivalent weights of HNO_3.

(i) $5Cu + 2HNO_3 \rightarrow 5CuO + N_2 + H_2O$

(ii) $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$

(a) 2 : 5 (b) 1 : 5

(c) 3 : 5 (d) 4: 5

Q.15 $H_3AsO_3 + I_2 + H_2O \rightarrow H_3AsO_4 + 2HI$

0.01 equivalent of arsenous acid will neutralize how many grams of NaOH?

(a) 0.1 (b) 0.3

(c) 0.2 (d) 0.4

Q.16 Given that the O.S. of sulphur is –2, calculate the gram equivalent wt. of sulphur.

(a) 16 (b) 8

(c) 32 (d) 64

Q.17 The equivalent weight of a metal is 36. What weight of the metal would give 9.322 gm of its chloride ?

(a) 1.6935 gm (b) 2.6935 gm

(c) 4.6935 gm (d) 3.6935 gm

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ			

Space for Rough Work

Q.18 $MnO_2(s) + 4HCl(aq) \xrightarrow{Heat} MnCl_2(aq.) + 2H_2O + Cl_2(g)$

The equivalent weight of MnO_2 in the above reaction is :

(a) 23.4 (b) 33.6

(c) 43.5 (d) 53.6

Q.19 Which of the following has the highest normality ? (consider each of the acid is 100% ionised.)

(a) 1 (M) H_2SO_4 (b) 1 (M) H_3PO_3

(c) 1 (M) H_3PO_4 (d) 1 (M) HNO_3

Q.20 0.45 gm of an acid of mol. wt. 90 was neutralised by 20 ml of 0.5 (N) caustic potash. The basicity of acid is-

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

Q.21 The equivalent wt. of a metal is double that of oxygen. How many times is weight of its oxide greater than the wt. of metal?

(a) 2 (b) 3 (c) 1.5 (d) 0.25

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 For the reaction :

$H_3PO_3 + Ba(OH)_2 \rightarrow BaHPO_3 + 2H_2O$

The correct statement(s) is/are

(1) The equivalent mass of H_3PO_3 is 41.

(2) $BaHPO_3$ is the acid salt

(3) $BaHPO_3$ is normal salt

(4) 1 mole of H_3PO_3 is completely neutralized by 1.5 moles of $Ba(OH)_2$

Q.23 Choose the correct statements –

(1) If w_1 gm of the element 'X' combines with w_2 gm of Cl then the equiv. wt. of $X = \frac{w_1}{w_2} \times 35.5$

(2) If metallic zinc or iron be added to a solution of silver nitrate or copper sulphate, finely divided silver or copper is precipitated, then $\frac{\text{wt. of Zn (or wt. of Fe)}}{\text{wt of Ag}} = \frac{\text{Equiv. wt. of Zn (or Equiv. wt. of Fe)}}{\text{Equiv. wt of Ag}}$

(3) If w_1 gm of the element 'X' combines with w_2 gm of Cl then the equiv. wt. of $X = \frac{w_2}{w_1} \times 35.5$

(4) If metallic zinc or iron be added to a solution of silver nitrate or copper sulphate, finely divided silver or copper is precipitated, then $\frac{\text{wt. of Ag}}{\text{wt. of Zn (wt. of Fe)}} = \frac{\text{Equiv. wt. of Zn / (Equiv. wt. of Fe)}}{\text{Equiv. wt of Ag}}$

Q.24 Choose the correct statements –

(1) Double decomposition method is based on the law of equivalent.

(2) For a reaction, $P_nQ_n + R_OS_P \longrightarrow$ products

If amount of $P_m Q_n$ reacted = w_1 gm

and amount of R_oS_p reacted = w_2 gm, then

$\frac{w_1}{w_2} = \frac{\text{Equivalent wt of } R_oS_p}{\text{Equivalent wt of } P_nQ_n}$

(3) For a reaction $P_nQ_n + R_OS_P \longrightarrow$ products

If amount of $P_m Q_n$ reacted = w_1 gm

and amount of R_oS_p reacted = w_2 gm, then

$\frac{w_1}{w_2} = \frac{\text{Equivalent wt of } P_mQ_n}{\text{Equivalent wt of } R_oS_p}$

(4) 1 equivalent of oxygen = 16 gm

RESPONSE GRID					
	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ
	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ			

Space for Rough Work

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

The oxidation state of the elements in the pure state = 0. The equivalent wt of the element

$$E = \frac{\text{Atomic wt of the element}}{x}, \text{ where } x = \text{valency}$$

The equivalent wt of any compound = Sum of the equivalent wt of component elements or ions.

By using this relation we can calculate the equivalent wt. of any acidic and basic oxide.

Q.25 Equiv. wt. of Fe_2O_3 is –

(a) 26.5 (b) 33 (c) 46.34 (d) 38.3

Q.26 Equiv. wt of As_2O_3 is –

(a) 26.5 (b) 33 (c) 46.34 (d) 38.3

Q.27 The molecular wt. of R_2O_3 is 326. What is the equivalent wt of R?

(a) 26.5 (b) 33 (c) 46.34 (d) 38.3

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 : As mole is the basic chemical unit, the concentration of the dissolved solute is usually specified in terms of number of moles of solute.

Statement-2 : The total number of molecules of reactants involved in a balanced chemical equation is known as molecularity of the reaction.

Q.29 Statement-1 : Equivalent weight of Cu in CuO is 31.8 and in Cu_2O is 63.6.

Statement-2 : Equivalent weight of an element

$$= \frac{\text{Atomic weight of the element}}{\text{Valency of the element}}$$

Q.30 Statement-1 : 1.231 has three significant figures.

Statement-2 : All numbers right to the decimal point are significant.

RESPONSE GRID	25.ⓐⓑⓒⓓ 26.ⓐⓑⓒⓓ 27.ⓐⓑⓒⓓ 28.ⓐⓑⓒⓓ 29.ⓐⓑⓒⓓ 30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 1 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	32	Qualifying Score	52
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

01

(1) **(a)** N_A no of electron will be removed by

$$\frac{6.023\times10^{23}}{2.25\times10^{23}} \times 16 \text{ gm of metal M}$$

$= 42.83$ gm of metal M

$\therefore$ Equiv. wt. of metal is 42.83

(2) **(b)** 100g of $ZnSO_4$ crystals are obtained from $= 22.65$ g Zn

1g of $ZnSO_4$ crystal will be obtained from $= \frac{22.65}{100}$ gZn

20g of $ZnSO_4$ crystals obtained from

$$= \frac{22.65}{100} \times 20 = 4.53\text{g}$$

(3) **(b)** The equiv. wt. of $P_4 = \frac{31\times4}{5\times4} = \frac{31}{5}$

$\therefore$ 62 gm $P_4 = \frac{62\times5}{31}$ equiv. of $P_4 = 10$ equiv. of P_4

The equiv. wt. of $HNO_3 = \frac{\text{Mol. wt}}{1} = \frac{63}{1}$

$\therefore$ Wt. of HNO_3 required $= 10 \times 63 = 630$ gm

(4) **(a)** $\because$ 1.429 gm of O_2 gas occupies volume $= 1$ litre.

$\therefore$ 32gm of O_2 gas occupies $= \frac{32}{1.429} = 22.4$ litre/mol.

(5) **(d)** Equiv. of HCl taken $= 60 \times 2 \times 10^{-3}$

Equiv. of HCl present after the reaction

$= 20 \times 1 \times 10^{-3}$

$\therefore$ Equiv. of HCl utilized $= (120 - 20) \times 10^{-3}$

$= 100 \times 10^{-3}$

$\therefore$ 100×10^{-3} equiv. of metal carbonate $= 6.90$ gm

$\therefore$ 1 equiv. of metal carbonate $= \frac{6.90}{10^{-1}} = 69$ gm

$\therefore$ equiv. wt. of metal $= 69 - 30 = 39$

[because equiv. wt. of carbonate $= 30$]

(6) **(a)** The equiv. of H^+ in 10 ml of $\left(\frac{N}{2}\right)$ HCl $= \frac{10}{2} \times 10^{-3}$

The equiv. of H^+ in 30 ml of $\left(\frac{N}{10}\right)$ HNO_3

$$= \frac{30}{10} \times 10^{-3}$$

The equiv. of H^+ in 75 ml of $\left(\frac{N}{5}\right)$ HNO_3

$$= \frac{75}{5} \times 10^{-3}$$

Hence, total equiv. of $H^+ = (5 + 3 + 15) \times 10^{-3}$

$= 23 \times 10^{-3}$

total volume of solution $= 115$ ml

Hence, normality of H^+ in the resulting mixture

$$= \frac{23\times10^{-3}\times10^{3}}{115}(N) = \left(\frac{N}{5}\right) = 0.2\,(N)$$

(7) **(c)** Significant figures are 4, 4, 4

(8) **(c)** $$\frac{(29.2 - 20.2)(1.79\times10^{5})}{1.37} = \frac{9.0\times1.79\times10^{5}}{1.37}$$

$= 11.7\times10^{5}$

Thus the number of significant figures $= 3$

(9) **(b)** Given $x = 14, y = 16$

According to the given data, compounds formed by x and y will be

xy, xy_2, xy_3, xy_4 & xy_5

(A) (B) (C) (D) (E)

$\therefore$ In compound A, x & y are present in the ratio 28 : 16

$\therefore$ In compound C (xy_3), the ratio will be 28 : 48

(10) **(c)** Writing the equation of combustion of propane (C_3H_8), we get

$$\underset{1\text{vol}}{C_3H_8} + \underset{5\text{vol}}{5O_2} \rightarrow 3CO_2 + 4H_2O$$

1L 5L

From the above equation we find that we need 5 L of oxygen at NTP to completely burn 1 L of propane at N.T.P.

If we change the conditions for both the gases from N.T.P. to same conditions of temperature and pressure. The same results are obtained. i.e. 5 L is the correct answer.

(11) **(a)** $\overset{+5}{H}N\overset{}{O_3} + H_2\overset{-2}{S} \rightarrow H_2O + \overset{+2}{N}O + \overset{0}{S}$

The x factor for $HNO_3 = 5 - 2 = 3$

Hence equivalent wt. of HNO_3

$$= \frac{\text{mol. wt. of } HNO_3}{3} = \frac{63}{3} = 21$$

(12) **(c)** $\overset{+5}{ClO_3^-} + Fe^{2+} + H^+ \rightarrow Cl^- + Fe^{3+} + H_2O$

The x factor for $ClO_3^- = 5 - (-1) = 6$

Hence equivalent wt. of ClO_3^-

$$= \frac{\text{formula wt. of } ClO_3^-}{6} = \frac{83.5}{6} = 13.9167$$

(13) **(d)** Round off the digit at 2nd position of decimal
3.929 = 3.93

(14) **(b)**

(i) $5Cu + 2\overset{+5}{H}N O_3 \rightarrow 5CuO + \overset{0}{N_2} + H_2O$

As per the given reaction,
Change in O No. of N = 5

$$\text{the (equiv wt)}_I \text{ of } HNO_3 = \frac{\text{Mol. wt of } HNO_3}{5}$$

(ii) The given reaction is simply acid-base reaction and one replacable H atom present in HNO_3 is replaced by Na.

$$\therefore \text{ the (equivwt)}_{II} \text{ of } HNO_3 = \frac{\text{Mol.wt of } HNO_3}{1}$$

$$\therefore \text{ the (equiv wt)}_I : \text{(Equivwt)}_{II} = \frac{1}{5} : 1 = 1 : 5$$

(15) **(d)** $\overset{+3}{H_3}AsO_3 + I_2 + H_2O \rightarrow \overset{+5}{H_3}AsO_4 + 2HI$

$\therefore$ x = 2

$$\text{equiv. wt of } H_3AsO_3 = \frac{\text{Mol. wt. of } H_3AsO_3}{2}$$

$$= \frac{126}{2} = 63$$

Since 1 eq. of $H_3As\bullet_3$ = 63g $H_3As\bullet_3$

$\therefore$ 0.01 equivalent of H_3AsO_3 = 0.63 gm H_3AsO_3

$H_3AsO_3 + 2NaOH = Na_2HAsO_3 + 2H_2O$

126gm H_3AsO_3 reacts with 80 gm. of NaOH

0.63 gm. H_3AsO_3 reacts with

$$\frac{80}{126} \times 0.63 \text{ gm of NaOH} = 0.4 \text{ gm of NaOH}$$

(16) **(a)** O.S. of S = –2, it meansits valency = 2

$$\therefore \text{ Equiv. wt. of S} = \frac{32}{2} = 16.$$

(17) **(c)** Theequiv. wt. of metal = 36
The equiv. wt. of chlorine = 35.5
Equiv. wt of metal chloride = 71.5
71.5 gm. metal chloride contain 36 gm of metal
9.322 gm metal chloride contain

$$\frac{36}{71.5} \times 9.322 \text{ gm of metal} = 4.6935 \text{ gm of metal}$$

$\therefore$ 4.6935 gm metal give 9.322 gm metal chloride

(18) **(c)** $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

1 mole = M 71 g

$\because$ 71 g of Cl_2 is displaced by

= 1 mole (M) of MnO_2

$\therefore$ 35.5 g of Cl_2 is displaced by

$$= \frac{M}{71} \times 35.5 = \frac{M}{2} \text{ of } MnO_2$$

$\therefore$ Equivalent weight of MnO_2

$$= \frac{\text{Molecular mass}}{2} = \frac{87}{2} = 43.5$$

(19) **(c)** Thenormality of 1(M) H_2SO_4 = 2(N)
The normality of 1(M) H_3PO_3 = 2(N)
The normality of 1 (M) H_3PO_4 = 3(N)
The normality of 1(M) HNO_3 = 1(N)

(20) **(b)** 20 ml of 0.5 (N) caustic potash
= $20 \times 0.5 \times 10^{-3}$ equiv. of caustic potash

$\therefore$ $20 \times 0.5 \times 10^{-3}$ equiv. of acid = 0.45 gm

$$\therefore \text{ 1 equiv. of acid} = \frac{0.45}{10 \times 10^{-3}} = 45 \text{ gm}$$

$$\therefore \text{ x for acid} = \frac{90}{45} = 2$$

Hence, basicity of acid = 2

(21) **(c)** Eq. wt. of oxygen = 8

$\therefore$ Equiv. wt. of the metal = 16

The equiv. wt. of the metal oxide = 16 + 8 = 24

$\therefore$ Oxide is $\frac{24}{16}$ = 1.5 times greater than the wt. of metal

(22) **(d)** H_3PO_3 is a dibasic acid. Equivalent mass = molar mass / 2 = 82/2 = 41

(23) **(b)** (1) w_2 gm Cl combines with w_1 gm of X

35.5 gm Cl combines with $\frac{w_1}{w_2} \times 35.5$ gm of X

$\therefore$ Theequiv. wt. of X = $\frac{w_1}{w_2} \times 35.5$

(2) If metallic zinc or iron be added to a solution of silver nitrate or copper sulphate, finely divided silver or copper is precipitated then

$$\frac{\text{wt. of Zn (or Fe)}}{\text{wt of Ag}} = \frac{\text{Equiv. wt. of Zn (or Equiv. wt. of Fe)}}{\text{Equiv. wt of Ag}}$$

(24) **(d)**

(1) Double decomposition method is based on the law of equivalent. As per this law, substances react in the proportion of their equivalent amount.

(3) For a reaction $P_mQ_n + R_oS_p \rightarrow$ products
If amount of P_mQ_n reacted = w_1 gm
and amount of R_oS_p reacted = w_2 gm then

$$\frac{w_1}{w_2} = \frac{\text{Equivalent wt of } P_mQ_n}{\text{Equivalent wt of } R_oS_p}$$

(25) (a), (26) (b), (27) (c).

(25) Equiv. wt. of Fe_2O_3

$$= \frac{\text{Atomic wt of Fe}}{3} + \text{Equivalent wt of O}$$

$$= \frac{56}{3} + 8 = 26.5$$

(26) Equiv. wt of $As_2O_3 = \frac{75}{3} + 8 = 33$

(27) Let the At. wt. of R is A_r.

$\therefore 2A_r + 48 = 326$

or $A_r = \frac{326-48}{2} = 139$

$\therefore 3 \times 16$ gm O combines with 2×139 gm of A_r

$\therefore$ 8 gm O combines with $\frac{2 \times 139}{3 \times 16} \times 8$ gm of A_r

$= \frac{139}{3}$ gm of $A_r = 46.34$ gm of A_r

$\therefore$ Equivalent wt of R = 46.34

(28) (b) The number of moles of a solute present in litre of solution is known is as molarity (M).

The total no. of molecules of reactants present in a balanced chemical equation is known as molecularity.

For example,

$PCl_5 \rightarrow PCl_3 + Cl_2$ (Unimolecular)

$2HCl \rightarrow H_2 + I_2$ (Bimolecular)

$\therefore$ Molarity and molecularity are used in different sense.

(29) (a) Equivalent wt. of Cu in CuO

$$= \frac{\text{At. wt.}}{\text{Valency}} = \frac{63.6}{2} = 31.8$$

Equivalent wt. of Cu in $Cu_2O = \frac{63.6}{1} = 63.6$

(Valency of Cu = 1)

(30) (c) 1.231 has four significant figures all number from left to right are counted, starting with the first digit that is not zero for calculating the number of significant figure.