

- Q1** Patients suffering from AIDS can be helped using which of the following drugs?  
(A) Cisplatin  
(B) AZT (Azidothymidine)  
(C) Taxol  
(D) Codeine
- Q2** What is the human body temperature in Fahrenheit?  
(A) 212  
(B) 98.6  
(C) 273.15  
(D) 32
- Q3** Which set of figures will be obtained after rounding up the following up to three significant figures? 34.216, 0.04597, 10.4107  
(A) 34.3, 0.0461, 10.4  
(B) 34.2, 0.0460, 10.4  
(C) 34.20, 0.460, 10.40  
(D) 34.21, 4.597, 1.04
- Q4** In an experiment, 2.4 g of iron oxide on reduction with hydrogen gave 1.68 g of iron. In another experiment, 2.7 g of iron oxide gave 1.89 g of iron on reduction. Which law is illustrated from the above data?  
(A) Law of constant proportions  
(B) Law of multiple proportions  
(C) Gay Lussac's law of gaseous volume  
(D) Law of conservation of mass
- Q5** The molecular mass of glucose ( $C_6H_{12}O_6$ ) is  
(A) 160.8 u  
(B) 180.162 u  
(C) 216.4 u  
(D) 134.821 u
- Q6** The number of molecules of water in 333 g of  $Al_2(SO_4)_3 \cdot 18H_2O$  is  
(A)  $18.0 \times 6.023 \times 10^{33}$   
(B)  $9.0 \times 6.023 \times 10^{23}$   
(C) 18.0  
(D) 36.0
- Q7** Which is heaviest?  
(A) 25 g mercury  
(B) 2 mol carbon dioxide  
(C) 2 mol water  
(D) 4 g atom of oxygen
- Q8** What is the total number of electrons present in 1.6 g of methane?  
(A)  $6.023 \times 10^{23}$   
(B) 16  
(C)  $12.04 \times 10^{23}$   
(D)  $6.023 \times 10^{24}$
- Q9** The volume occupied by 1 mole atom of a diatomic gas at STP is  
(A) 22.4 L  
(B) 11.2 L  
(C) 5.6 L  
(D) 44.8 L
- Q10** What will be the standard molar volume of He, if its density is 0.1784 g/L at STP?  
(A) 11.2 L  
(B) 22.4 L  
(C) 5.6 L  
(D) 2.8 L
- Q11** If one million atoms of silver weigh  $1.79 \times 10^{-16}$  g, the gram atomic weight of silver is  
(A) 1.708  
(B) 107.8  
(C) 10.78  
(D) None of these



- Q12** Match the mass of elements given in column I with the no. of moles in column II and mark the appropriate choice.

Column I		Column II	
(A) )	28 g of He	(i)	2 moles
(B) )	46 g of Na	(ii) )	7 moles
(C) )	60 g of Ca	(ii) i)	1 mole
( D )	27 g of Al	(i v)	1.5 moles

- (A) (A) (iv), (B) (iii), (C) (ii), (D) ( )  
 (B) (A) (i), (B) (iii), (C) (ii), (D) (iv)  
 (C) (A) (iii), (B) (ii), (C) (i), (D) (iv)  
 (D) (A) (ii), (B) (i), (C) (iv), (D) (iii)

- Q13** The empirical formula of a compound is  $\text{CH}_2\text{O}$  and its molecular mass is 120. The molecular formula of the compound is.

- (A)  $\text{C}_3\text{H}_6\text{O}_3$  (B)  $\text{C}_2\text{H}_4\text{O}_2$   
 (C)  $\text{C}_5\text{H}_{10}\text{O}_5$  (D)  $\text{C}_4\text{H}_8\text{O}_4$

- Q14** Compound A contains 8.7% hydrogen, 74% carbon and 17.3% nitrogen. The molecular formula of the compound is

(Given: Atomic masses of C, H and N are 12, 1 and 14 amu respectively. The molar mass of the compound A is  $162 \text{ g mol}^{-1}$ .)

- (A)  $\text{C}_4\text{H}_6\text{N}_2$  (B)  $\text{C}_2\text{H}_3\text{N}$   
 (C)  $\text{C}_5\text{H}_7\text{N}$  (D)  $\text{C}_{10}\text{H}_{14}\text{N}_2$

- Q15** If 0.5 moles of  $\text{BaCl}_2$  are mixed with 0.2 moles of  $\text{Na}_3\text{PO}_4$ , the maximum number of moles of  $\text{Ba}_3(\text{PO}_4)_2$  that can be formed, is

- (A) 0.7 (B) 0.5  
 (C) 0.30 (D) 0.10

- Q16** Q. The molarity of a solution obtained by mixing 750 mL of 0.5 M HCl with 250 mL of 2 M HCl will be.

- (A) 0.975 M (B) 0.875 M  
 (C) 1.00 M (D) 1.75 M

- Q17** On reduction with hydrogen, 3.6 g of an oxide of metal left 3.2 g of metal. If the vapour density of metal is 32, the simplest formula of the oxide would be

- (A) MO (B)  $\text{M}_2\text{O}$   
 (C)  $\text{M}_2\text{O}_3$  (D)  $\text{M}_2\text{O}_5$

- Q18** 1 L of 0.1 M NaOH, 2 L of 0.2 M KOH is mixed. The final concentration of the solution is

- (A) 0.01 M (B) 0.016 M  
 (C) 0.16 M (D) 0.001 M

- Q19** 4.28 g of NaOH is dissolved in water and the solution is made to 250 cc. What will be the molarity of the solution?

- (A)  $0.615 \text{ mol L}^{-1}$   
 (B)  $0.428 \text{ mol L}^{-1}$   
 (C)  $0.99 \text{ mol L}^{-1}$   
 (D)  $0.301 \text{ mol L}^{-1}$

- Q20** 20 mL of methane is completely burnt using 50 mL of oxygen. The volume of the gas left after cooling to room temperature is

- (A) 80 ml (B) 40 mL  
 (C) 60 ml (D) 30 mL

- Q21** A sample of sea water contains  $5 \times 10^{-3}$  g of dissolved oxygen in 1 kilogram of the sample. The concentration of  $\text{O}_2$  in that sea water sample in ppm is

- (A)  $5 \times 10^{-4}$  (B)  $5 \times 10^{-3}$   
 (C)  $5 \times 10^{-2}$  (D) 5

- Q22** How many molecules of  $\text{CO}_2$  are formed when one milligram of 100% pure  $\text{CaCO}_3$  is treated with excess hydrochloric acid?

- (A)  $6.023 \times 10^{23}$  (B)  $6.023 \times 10^{21}$   
 (C)  $6.023 \times 10^{20}$  (D)  $6.023 \times 10^{18}$

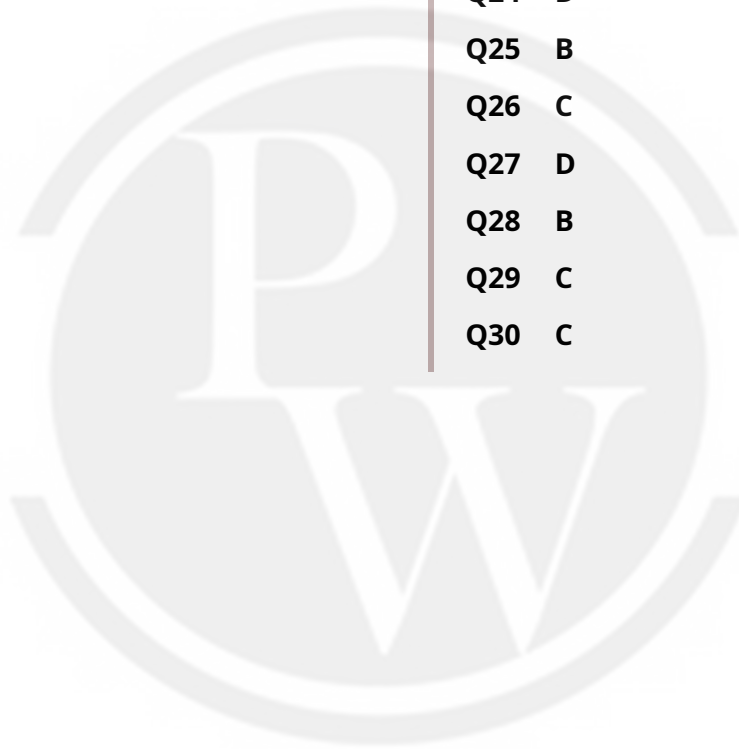




# Answer Key

Q1 B  
Q2 B  
Q3 B  
Q4 A  
Q5 B  
Q6 B  
Q7 B  
Q8 A  
Q9 B  
Q10 B  
Q11 B  
Q12 D  
Q13 D  
Q14 D  
Q15 D

Q16 B  
Q17 B  
Q18 C  
Q19 B  
Q20 D  
Q21 D  
Q22 D  
Q23 C  
Q24 D  
Q25 B  
Q26 C  
Q27 D  
Q28 B  
Q29 C  
Q30 C



# Hints & Solutions

Note: scan the QR code to watch video solution

## Q1 Text Solution:

The drug AZT is used from helping AIDS patients.

### Video Solution:



## Q2 Text Solution:

Human body maintains a temperature of  $37^{\circ}\text{C}$

$$F = \frac{9 \times ^{\circ}\text{C}}{5} + 32$$

$$= \frac{9 \times 37}{5} + 32 = 98.6\text{F}$$

### Video Solution:



## Q3 Text Solution:

34.2, 0.0460, 10.4

### Video Solution:



## Q4 Text Solution:

### In first experiment,

Mass of iron oxide = 2.4 g

Mass of iron = 1.68 g

Mass of oxygen =  $2.4 - 1.68 = 0.72$

Ratio of masses of iron and oxygen  
 $= \frac{1.68}{0.72} = 7 : 3$

### In second experiment,

Mass of iron oxide = 2.7 g

Mass of iron = 1.89 g

Mass of oxygen =  $2.7 - 1.89 = 0.81$

Ratio of masses of iron and oxygen  
 $= \frac{1.89}{0.81} = 7 : 3$

The same ratio confirms that these experiments clarify Law of constant proportions.

### Video Solution:



## Q5 Text Solution:

Molecular mass of  $\text{C}_6\text{H}_{12}\text{O}_6$

$$= (6 \times 12.011) + (12 \times 1.008) + (6 \times 16.00)$$

$$= 72.066 + 12.096 + 96.00 = 180.162 \text{ u}$$

Therefore, molecular mass of glucose is 180.162 u.

### Video Solution:



**Q6 Text Solution:**

One molecule of the compound contains 18 molecules of water.

Number of water molecules in 333 g of compound

$$= \text{number of moles} \times 6.023 \times 10^{23} \times 18$$

$$= \frac{333}{666} \times 6.023 \times 10^{23} \times 18 = 9 \times 6.023 \times 10^{23}$$

**Video Solution:****Q7 Text Solution:**

Mass of mercury = 25 g

Mass of 2 mol of carbon dioxide (CO<sub>2</sub>) = 2 × 44 = 88 g

Mass of 2 mol of water (H<sub>2</sub>O) = 2 × 18 = 36 g

Mass of 4 g atom of oxygen (O) = 4 × 16 = 64 g

**2 mol of carbon dioxide = 88 g is the heaviest**

**Video Solution:****Q8 Text Solution:**

1 mole of CH<sub>4</sub> = 16g

16 g of CH<sub>4</sub> contain 10 electrons

1.6 g of CH<sub>4</sub> contain

$$\frac{10}{16} \times 1.6 \times 6.023 \times 10^{23}$$

$$= 6.023 \times 10^{23} \text{ electrons.}$$
**Video Solution:****Q9 Text Solution:**

1 mole of a diatomic gas contains 2 moles of atom (H<sub>2</sub> contains 2 moles of H-atom) and occupies 22.4 L of volume.

Hence volume occupied by 1 mole of atom of diatomic gas is 22.4/2 L i.e., 11.2 L.

**Video Solution:****Q10 Text Solution:**

Standard molar volume is the volume occupied by 1 mole of a gas at STP.

0.1784 g of He occupies volume = 1 L

4 g (1 mole) of He occupies  $\frac{4}{0.1784} = 22.4 \text{ L}$

**Video Solution:**

**Q11 Text Solution:**

Gram atomic mass refers to the mass of avogadro number of particles in grams

$$10^6 \text{ atoms} = 1.79 \times 10^{-16} \text{ g}$$

$$N_A (6.023 \times 10^{23} \text{ atoms}) = ?$$

$$= \frac{1.79 \times 10^{-16} \times 6.023 \times 10^{23}}{10^6} = 107.8 \text{ g}$$

**Video Solution:****Q12 Text Solution:**

(A) 28 g of He =  $\frac{28}{4} = 7 \text{ mol}$

(B) 46 g of Na =  $\frac{46}{23} = 2 \text{ mol}$

(C) 60 g of Ca =  $\frac{60}{40} = 1.5 \text{ mol}$

(D) 27 g of Al =  $\frac{27}{27} = 1 \text{ mol}$

**Video Solution:****Q13 Text Solution:**

Empirical weight of  $\text{CH}_2\text{O} = 12 + 2 \times 1 + 16 = 30$

Empirical weight  $\times n =$  Molecular weight

$$n = \frac{\text{Molecular weight}}{\text{Empirical weight}} = \frac{120}{30} = 4$$

Molecular formula =

$$(\text{Empirical formula})_n = \text{C}_4\text{H}_8\text{O}_4$$

**Video Solution:****Q14 Text Solution:**

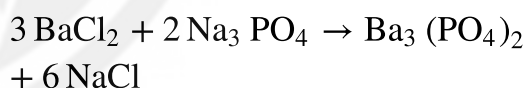
Element	% mass	Moles	Simplest whole number ratio
C	74	$\frac{74}{12} = 6.17$	$\frac{6.17}{1.236} = 5$
H	8.7	$\frac{8.7}{1} = 8.7$	$\frac{8.7}{1.236} = 7$
N	17.3	$\frac{17.3}{14} = 1.236$	$\frac{1.236}{1.236} = 1$

Empirical formula =  $\text{C}_5\text{H}_7\text{N}$

Empirical formula mass = 81

$$n \times 81 = 162 \quad n = 2$$

Hence, molecular formula is  $\text{C}_{10}\text{H}_{14}\text{N}_2$ .

**Video Solution:****Q15 Text Solution:**

Limiting reagent is  $\text{Na}_3\text{PO}_4$ .

0.2 mol  $\text{Na}_3\text{PO}_4$  will give

$$\text{Ba}_3(\text{PO}_4)_2 = \frac{1}{2} \times 0.2 = 0.1 \text{ mol.}$$

**Video Solution:**

**Q16 Text Solution:**

$$M_{\text{mix}} V_{\text{mix}} = M_1 V_1 + M_2 V_2$$

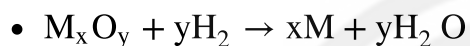
$$M_{\text{mix}} = \frac{M_1 V_1 + M_2 V_2}{V_{\text{mix}}} = \frac{0.5 \times 750 + 2 \times 250}{1000} = 0$$

. 875M

**Video Solution:****Q17 Text Solution:**

- Vapour density =  $\frac{\text{Molecular Mass}}{2}$

Molecular mass of metal =  $2 \times 32 = 64$



- The moles of metal will be =  $\frac{\text{given weight of metal}}{\text{atomic weight of metal}}$

- Moles of metal =  $\frac{3.2}{64}$  moles

- moles of metal oxide will be =  $\frac{\text{given weight of metal oxide}}{\text{molecular weight of metal oxide}}$

- Given weight of metal oxide = 3.6

Molecular weight of metal oxide =

$$64x + 16y$$

- Moles of metal oxide =  $\frac{3.6}{64x + 16y}$

- $\frac{0.05}{x} = \frac{3.6}{64x + 16y}$

- 

On simplifying we get:  $64x + 16y = 72x$

$$8x = 16y; x = 2y$$

- So the formula of metal oxide will be  $M_x O_y = M_{2y} O_y$ ; so on simplifying we will get  $M_2 O$

**Video Solution:****Q18 Text Solution:**

Total Volume ( $V_3$ ) = 3 L

Now,  $M_1 V_1 + M_2 V_2 = M_3 V_3$

$$0.1 \times 1 + 0.2 \times 2 = M_3 \times 3$$

$$0.1 + 0.4 = 3 M_3$$

$$M_3 = \frac{0.5}{3} = 0.16 \text{ M}$$

**Video Solution:****Q19 Text Solution:**

No. of moles of NaOH =  $\frac{4.28}{40} = 0.107$

Volume of solution =  $250 \text{ cm}^3$

$$M = \frac{n}{V \text{ (in L)}} = \frac{0.107}{250} \times 1000 = 0.428 \text{ mol}$$

$$\text{L}^{-1}$$

**Video Solution:**

**Q20 Text Solution:**

22400 mL of methane requires 2 x 22400 mL of oxygen for burning.

20 mL of methane will require = 2 x 20 mL of oxygen.

This means that 20 mL of methane will burn completely using 40 mL of oxygen.

Volume of the gas left will be of oxygen and carbon dioxide = (50 - 40) + 20 = 30 mL

**Video Solution:****Q21 Text Solution:**

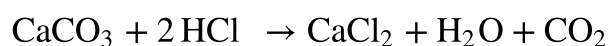
Dissolved oxygen =  $5 \times 10^{-3}$  g (Solute)

Mass of water (solvent) = 1 Kg =  $10^3$  g

$$\text{ppm} = \frac{\text{mass of solute}}{\text{mass of solvent}} \times 10^6$$

$$\text{ppm} = \frac{5 \times 10^{-3}}{10^3} \times 10^6 = 5$$

Concentration of  $\text{O}_2$  (in ppm) = 5 ppm

**Video Solution:****Q22 Text Solution:**

100 g of  $\text{CaCO}_3$  gives 1 mole

or  $6.023 \times 10^{23}$  molecules of  $\text{CO}_2$

$$10^{-3} \text{ g of } \text{CaCO}_3 \text{ gives } = \frac{6.023 \times 10^{23}}{100} \times 10^{-3}$$

$$= 6.023 \times 10^{18} \text{ molecules of } \text{CO}_2.$$

**Video Solution:****Q23 Text Solution:**

Suppose  $\omega$  gram of both  $\text{CH}_4$  and  $\text{H}_2$  were taken.

Moles

$$\text{H}_2 = \frac{\omega}{\text{M.W.}} = \frac{\omega}{2}; \text{ Moles of } \text{CH}_4 = \frac{\omega}{16}$$

$$\text{Mole fraction of } \text{H}_2 = \frac{\omega/2}{\omega/2 + \omega/16} = \frac{8}{9}$$

**Video Solution:****Q24 Text Solution:**

$$\text{No. of atoms} = \frac{\text{Weight}}{\text{Atomic mass}} \times N_A$$

$$20 \text{ g of Ca} = \frac{20}{40} N_A = 0.5 N_A;$$

$$24 \text{ g of Mg} = \frac{24}{24} N_A = 1 N_A$$

$$12 \text{ g of C} = \frac{12}{12} N_A = N_A;$$

$$24 \text{ g of C} = \frac{24}{12} N_A = 2 N_A$$

$$12 \text{ g of Mg} = \frac{12}{24} N_A = 0.5 N_A$$

**no. of atoms in 20 g of calcium = no. of atoms in 12 g of magnesium.**

**Video Solution:**

**Q25 Text Solution:**

The average isotopic mass or atomic mass

$$= \sum m_i \times \frac{x_i}{100}$$

Where  $m_i$  = mass of  $i^{th}$  isotope,  $x_i$  = abundance of  $i^{th}$  isotope

$$\therefore \text{Atomic mass} = \left(54 \times \frac{5}{100}\right)$$

$$+ \left(56 \times \frac{90}{100}\right) + \left(57 \times \frac{5}{100}\right)$$

$$= 55.95$$

**Video Solution:****Q26 Text Solution:**

According to stoichiometry of reaction  
1 mole of A reacts with 5 mole of B  
and 8 mole of C to form 6 mole of D  
and 7 mole of F.

So, 2 mole of A will react 10 mole of  
B and 16 mole of C.

But mole of C available = 4 mole

So, C is limiting reagent.

**Video Solution:****Q27 Text Solution:**

Both (A) and (R) are correct and (R) is the correct explanation of (A).

106 g  $\text{Na}_2\text{CO}_3$  = 1 mole = 1 g atom of C

12 g C = 1 g atom of C.

**Video Solution:****Q28 Text Solution:**

Molarity of  $\text{Na}_2\text{CO}_3$  solution

$$= \frac{2.65}{106} \times \frac{1000}{250} = 0.1 \text{ M}$$

$$M_1 V_1 = M_2 V_2$$

$$0.1 \times 10 = M_2 \times 1000 \Rightarrow M_2 = 0.001 \text{ M.}$$

**Video Solution:**

**Q29 Text Solution:**

Weight of sulphur combining with 12 g of carbon = 64g

Weight of oxygen combining with 12 g of carbon = 32 g

Weight ratio of sulphur and oxygen (S : O) = 2 : 1

10 g of sulphur combines with 10 g of oxygen to form SO<sub>2</sub>.

∴ Weight ratio of S and O in SO<sub>2</sub>, S : O = 1 : 1

Hence, law of reciprocal proportions.

**Video Solution:****Q30 Text Solution:**

On calculation we find  $\frac{(29.2-20.2)(1.79 \times 10^5)}{1.37} = 1.17 \times 10^6$  As the least precise number contains 3 significant figures therefore, answers should also contains 3 significant figures.

**Video Solution:**

[Android App](#)

| [iOS App](#)

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