ULTIMATE KCET CRASH COURSE 2026

CHEMISTRY

DPP: 1

MOLE CONCEPT

Q1 Which of the following contains the maximum number of atoms ?

(A) 1.0 g of hydrogen (H_2)

(B) 1.0 g of nitrogen (N_2)

(C) 1.0 g of oxygen (O_2)

(D) 1.0 g of water (H_2O)

Q2 Insulin contains 3.4% Sulphur. The minimum mol. weight of insulin is:

(A) 941.176 (B) 944

(C) 945.27 (D) None of these

Q3 Which has the highest mass?

(A) 1 m^3 water

(B) 10 L of Hg

(C) A normal adult man

(D) All have same weight.

Q4 At STP, weight of 1 litre gas is 2 g. Find out its molecular mass?

(A) 22.4 (B) 44.8

(C) 11.2 (D) 5.6

Q5 Gram molecular volume of oxygen at STP is

(A) 11200 cm^3 (B) 22400 cm^3

(C) 5600 cm^3 (D) 3200 cm^3

Q6 The number of gram molecules of chlorine in 6.02×10^{25} hydrogen chloride molecules is

(A) 10 (B) 100

(C) 50 (D) 5

Q7 The maximum number of molecules is present in:

(A) 15 L of H_2 gas at STP

(B) 5 L of N_2 gas at STP

(C) 0.5 g of H_2 gas

(D) 10 g of O_2 gas

Q8 80 g of oxygen contains as many atoms as in

(A) 80 g of hydrogen

(B) 1 g of hydrogen

(C) 10 g of hydrogen

(D) 5 g of hydrogen

Q9 8 g of O_2 has the same number of molecules as:

(A) 7 g of CO (B) 11 g of CO_2

(C) 7 g of N_2 (D) All of these

Q10 Which one of the following statements is incorrect?

(A) One gram atom of carbon contains Avogadro's number of atoms.

(B) One mole of oxygen gas contains Avogadro's number of molecules.

(C) One mole of hydrogen gas contains Avogadro's number of atoms.

(D) One mole of electron stands for 6.02×10^{23} electrons

Q11 If 10^{21} molecules are removed from 200 mg of CO_2, then the number of moles of CO_2 left are

(A) 2.88×10^{-3}

(B) 1.66×10^{-3}

(C) 4.54×10^{-3}

(D) 1.66×10^{3}

Q12 What is the volume (in litres) of oxygen required at STP to completely convert 1.5 moles of sulphur into sulphur dioxide?

(A) 11.2 (B) 22.4

(C) 33.6 (D) 44.8

Q13 In which case is the number of molecules of water maximum?

(A) 0.00224 L of water vapours at 1 atm and 273 K

(B) 0.18 g of water

(C) 18 mL of water

(D) 10^{-3} mol of water

Q14 Which one of the following molecule will have largest number of molecules?

(A) 8.5 g NH_3

(B) 0.36 g H_2O

(C) 0.48 g CH_4

(D) 8.8 g CO_2

Q15 Match **List I** with **List II**.

List-I (Quantity of compound)		**List-II (Moles of compound)**	
(A)	44.8 L of CO at STP	(I)	2 mol
(B)	3.011×10^{24} molecules of glucose	(II)	20 mol
(C)	12.044×10^{24} molecules of CO_2	(III)	5 mol
(D)	49 g of H_2SO_4	(IV)	0.5 mol

Choose the **correct** answer from the options given below:

(A) A-I, B-III, C-II, D-IV

(B) A-IV, B-III, C-II, D-I

(C) A-II, B-IV, C-III, D-I

(D) A-IV, B-I, C-II, D-III

Q16 The volume of a drop of water is 0.04 mL. How many H_2O molecules are there in a drop of water (d = 1.0 g/mL)?

(A) 13.3×10^{21} molecules

(B) 1.33×10^{21} molecules

(C) 2.33×10^{21} molecules

(D) 23.3×10^{21} molecules

Q17 The number of atoms present in one mole of an element is equal to Avogadro's number. Which of the following element contains the greatest number of atoms?

(A) 4 g He (B) 46 g Na

(C) 0.40 g Ca (D) 12 g He

Q18 Volume occupied by 24 g of ozone gas at STP is:
(Molar mass of O_3=48 g/mol)

(A) 5600 mL (B) 22400 mL
(C) 11200 mL (D) 28000 mL

Q19 Number of atoms in 4.25 g of NH_3 is nearly

(A) 1×10^{23}
(B) 1.5×10^{23}
(C) 2×10^{23}
(D) 6×10^{23}

Q20 Given below are two statements, one is labelled as Assertion **(A)** and other is labelled as Reason **(R).**

Assertion (A) Both 106 g of sodium carbonate and 12 g of carbon have same number of carbon atoms.

Reason (R) Both contains 1 g atom of carbon which contains 6.023×10^{23} carbon atoms.

In the light of the above statements, choose the most appropriate answer from the options given below.

(A) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
(B) (A) is correct but (R) is incorrect.
(C) (A) is incorrect but (R) is correct.
(D) Both (A) and (R) are correct and (R) is the correct explanation of (A).

Answer Key

Q1	A
Q2	A
Q3	A
Q4	B
Q5	B
Q6	C
Q7	A
Q8	D
Q9	D
Q10	C
Q11	A
Q12	C
Q13	C
Q14	A
Q15	A
Q16	B
Q17	D
Q18	C
Q19	D
Q20	D

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Number of atoms = Number of molecules × number of atoms in one molecule

Number of atoms in 1.0 g hydrogen (H_2)

$= \frac{1}{2} \times N_A \times 2 = N_A$

Number of atoms in 1.0 g Nitrogen (N_2)

$= \frac{1}{28} \times N_A \times 2 = \frac{N_A}{14}$

Number of atoms in 1.0 g Nitrogen (O_2)

$= \frac{1}{32} \times N_A \times 2 = \frac{N_A}{16}$

Number of atoms in 1.0 g water (H_2O)

$= \frac{1}{18} \times N_A \times 3 = \frac{N_A}{6}$

Thus, 1 g of hydrogen has maximum number of atoms.

Video Solution:

Q2 Text Solution:

3.4 g S = 100 g insulin

$\therefore 32gS = \frac{100 \times 32}{3.4} = 941.176$

Insulin must contain at least one atom of S in its one molecule.

Video Solution:

Q3 Text Solution:

1 m^3 water = 1000 L = 1000 kg (Density = 1g/mL)

10 L Hg = 10 × 13.6 = 136 kg (Density = 13.6 g/mL)

A normal adult man = 60 to 80 kg.

Video Solution:

Q4 Text Solution:

$\frac{2}{MW} = \frac{1}{22.4}$

$MW = 44.8$

Video Solution:

Q5 Text Solution:

Gram molecular volume of oxygen at STP is $22400\ cm^3$.

i.e. volume of 1 mole of oxygen molecule $= \frac{22400}{1} = 22400\ cm^3$.

Video Solution:

Q6 Text Solution:

Number of HCl molecules = 6.02 x 10^{25} molecules

Number of moles of HCl= $\frac{6.02\times10^{25}}{6.02\times10^{23}}$

= 100 moles

∴ Gram molecular mass of chlorine in 6.023 x 10^{25} molecules of HCl = 100/2 = 50

Video Solution:

Q7 Text Solution:

$\text{Moles of } H_2 = \frac{15}{22.4} = 0.67$

$\text{Moles of } N_2 = \frac{5}{22.4} = 0.22$

$\text{Moles of } H_2 = \frac{0.5}{2} = 0.25$

$\text{Moles of } O_2 = \frac{10}{32} = 0.31$

Larger is number of mole, more is number of molecule.

Video Solution:

Q8 Text Solution:

Number of moles of oxygen = $\frac{80}{16}$

Number of atoms of oxygen $= \frac{80}{16} \times N_A \times 2 = 5 \times N_A \times 2$

Number of moles of 5g of hydrogen= $\frac{5}{1}$

Number of atoms in 5g of hydrogen = 5 × N_A × 2.

Hence, the number of atoms in 80g of oxygen is equal to the number of atoms in 5 g of hydrogen.

Video Solution:

Q9 Text Solution:

All of these

Video Solution:

Q10 Text Solution:

One mole of hydrogen gas contains Avogadro's number of molecules.

Video Solution:

Q11 Text Solution:

Number of molecules in 200 mg CO_2

$= \frac{200\times10^{-3}}{44} \times 6.023 \times 10^{23} = 2.74 \times 10^{21}$

Number of molecules remaining after removal

$= 2.74 \times 10^{21} - 10^{21} = 1.74 \times 10^{21}$

Number of moles= $\frac{1.74\times10^{21}}{6.023\times10^{23}} = 2.88 \times 10^{-3}$.

Video Solution:

Q12 Text Solution:

$S + O_2 \rightarrow SO_2$

32 g 32 g

1 mole 22.4 L

1 mole of S required volume of

So, 1.5 mole of S required volume of

O_2 = 22.4×1.5=33.60 L

Video Solution:

Q13 Text Solution:

(i) Number of moles (H_2O)

$= \frac{\text{Mass of substance in g}(W_{H_2O})}{\text{Molar mass in g mol}^{-1}(M_{H_2O})}$

$w_{H_2O} = 18$ g [∴ Density of water (d_{H_2O})=1 g /mL]

Number of molecules of water = 1 × N_A

(ii) 0.18 g of water,

$\therefore \quad n_{H_2O} = \frac{18}{18} = 1$

Number of molecules of water = 0.01 × N_A

(iii) 0.00224 L of water vapours at 1 atm and 273 K.

At STP [1atm and 273 K],

Number of moles [with refrence to volume]

$= \frac{\text{Volume of gas in litre}}{22.4} = \frac{0.00224}{22.4} = 0.0001$

(iv) 10^{-3} mol of water

Number of molecules of water = 10^{-3} × N_A.

Video Solution:

Q14 Text Solution:

Moles = mass / molar mass.

NH_3: 8.5 g ÷ 17 g mol ^{1} = 0.50 mol

H_2O: 0.36 g ÷ 18 g mol ^{1} = 0.02 mol

CH_4: 0.48 g ÷ 16 g mol ^{1} = 0.03 mol

CO_2: 8.8 g ÷ 44 g mol ^{1} = 0.20 mol

More moles imply more molecules (each mol = N molecules); hence the NH_3 sample has the largest count.

Video Solution:

Q15 **Text Solution:**

44.8 L CO at STP ÷ 22.4 L mol ^{1} = **2 mol** I.

3.011 × 10^{24} glucose molecules ÷ N = **5 mol** III.

12.044 × 10^{24} CO_2 molecules ÷ N = **20 mol** II.

49 g H_2SO_4 ÷ 98 g mol ^{1} = **0.5 mol** IV.

Hence the matching set is A-I, B-III, C-II, D-IV.

Video Solution:

Q16 **Text Solution:**

Volume of 1 drop of H_2O = 0.04 mL

Weight of 1 drop of H_2O = Volume × Density

= 0.04 × 1 = 0.04 g

1 mole of H_2O = 18 g

= 6.023 × 10^{23} molecules

$\therefore 0.04\ g\ of\ H_2O = \frac{6.023\times10^{23}\times0.04}{18}$

= 1.3384 × 10^{21} molecules.

Video Solution:

Q17 **Text Solution:**

$n = \frac{w}{M}$

$4\ g\ He = \frac{4g}{4g/mol} = 1\ \text{mole}$

$46\ g\ Na = \frac{46g}{23g/mol} = 2\ \text{mole}$

$0.40\ g\ Ca = \frac{0.40g}{40\ g/mol} = 0.01\ \text{mole}$

$12\text{g He} = \frac{12g}{4g/mol} = 3\ \text{mole}$

Video Solution:

Q18 **Text Solution:**

(3)

Moles of $O_3(g) = \frac{24}{48} = 0.5$

Volume of $O_3(g)$ at STP = moles × 22.4 L

= 0.5 × 22.4 L = 11.2 L

= 11200 mL

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Video Solution:

Q19 **Text Solution:**

Number of molecules in 4.25 g NH_3

= N_A x number of moles= $N_A \times \frac{4.25}{17} = \frac{N_A}{4}$

1 molecule contains = 4 atoms (1 nitrogen and 3 hydrogen)

So, total number of atoms present $= 4 \times \frac{N_A}{4} = 6.023 \times 10^{23}$.

Video Solution:

Q20 **Text Solution:**

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

106 g Na_2CO_3 = 1 mole = 1 g atom of C

12 g C = 1 g atom of C.

Video Solution: