YAKEEN NEET 2.0

2026

Some Basic Concept of Chemistry

Physical Chemistry | Lecture -05

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Topics to be covered

1. Revision of Last Class
2. Mole Concept
3. Interconversion to mass, molecules and Volume of Gas at NTP/STP
4.  Trick for fast calculation
5. MPQ (Magarmach Practice Questions) & Home work from Modules

Rules to Attend Class

1. Always sit in a peaceful environment with headphone and be ready with your copy and pen.
2. Never ever attend a class from in between or don't join a live class in the middle of the chapter.
3. Make sure to revise the last class before attending the next class & always complete your home work.
4. Never ever engage in chat whether live or recorded on the topic which is not being discussed in current class as by doing so u can be blocked by the admin team or your subscription can be cancelled.

Rules to Attend Class

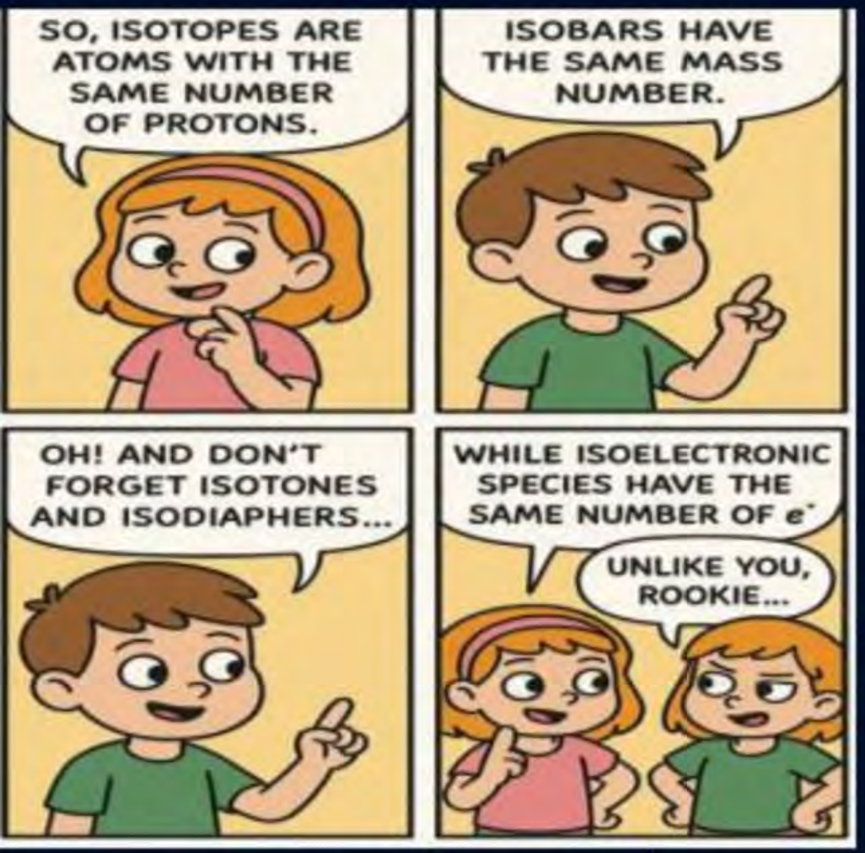
5. Try to make maximum notes during the class if something is left then u can use the notes pdf after the class to complete the remaining class.
6. Always ask your doubts in doubt section to get answer from faculty. Before asking any doubt please check whether same doubt has been asked by someone or not.
7. It does not matter whatever situation you are in NEVER EVER CREATE A BACKLOG BECAUSE IT MAY RESULT IN BACKLOG FOR YOUR DREAM COLLEGE.

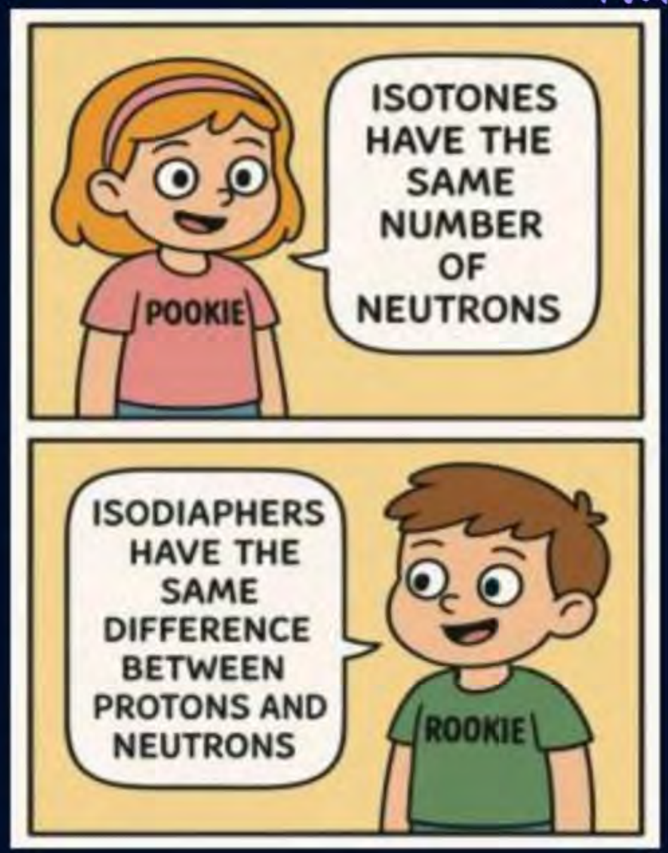

There is one big flaw in your Preparation that's name is Backlog ? What do we say to Backlog ?
NOT TODAY !!!

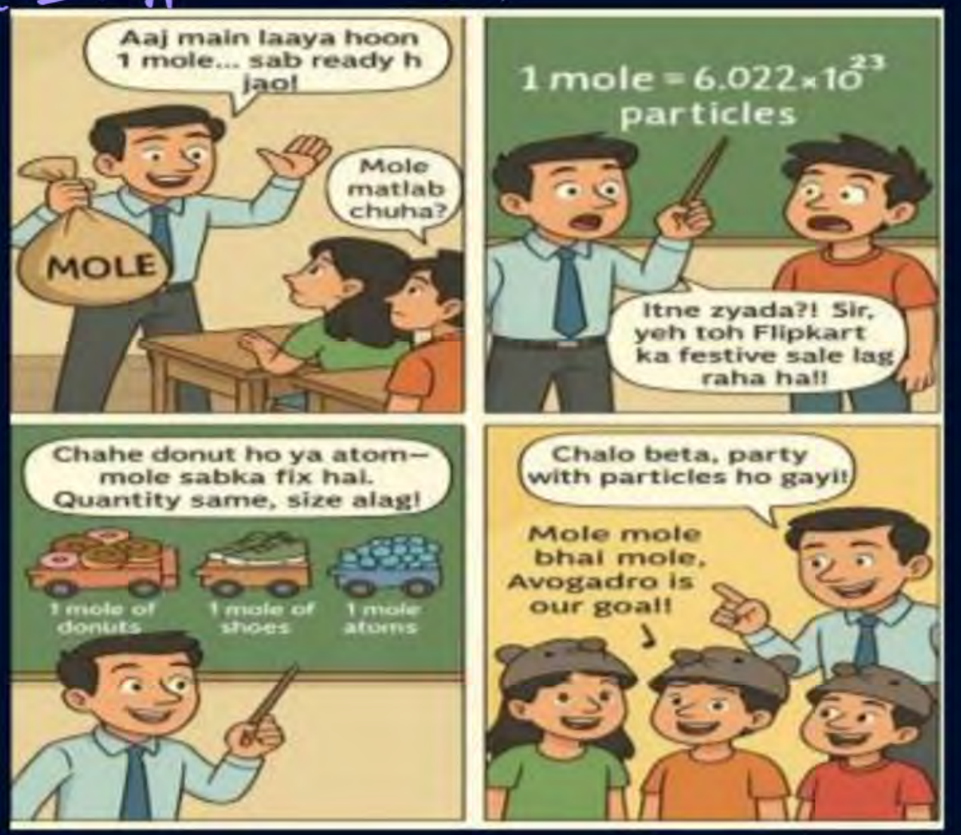
Revision of Last class

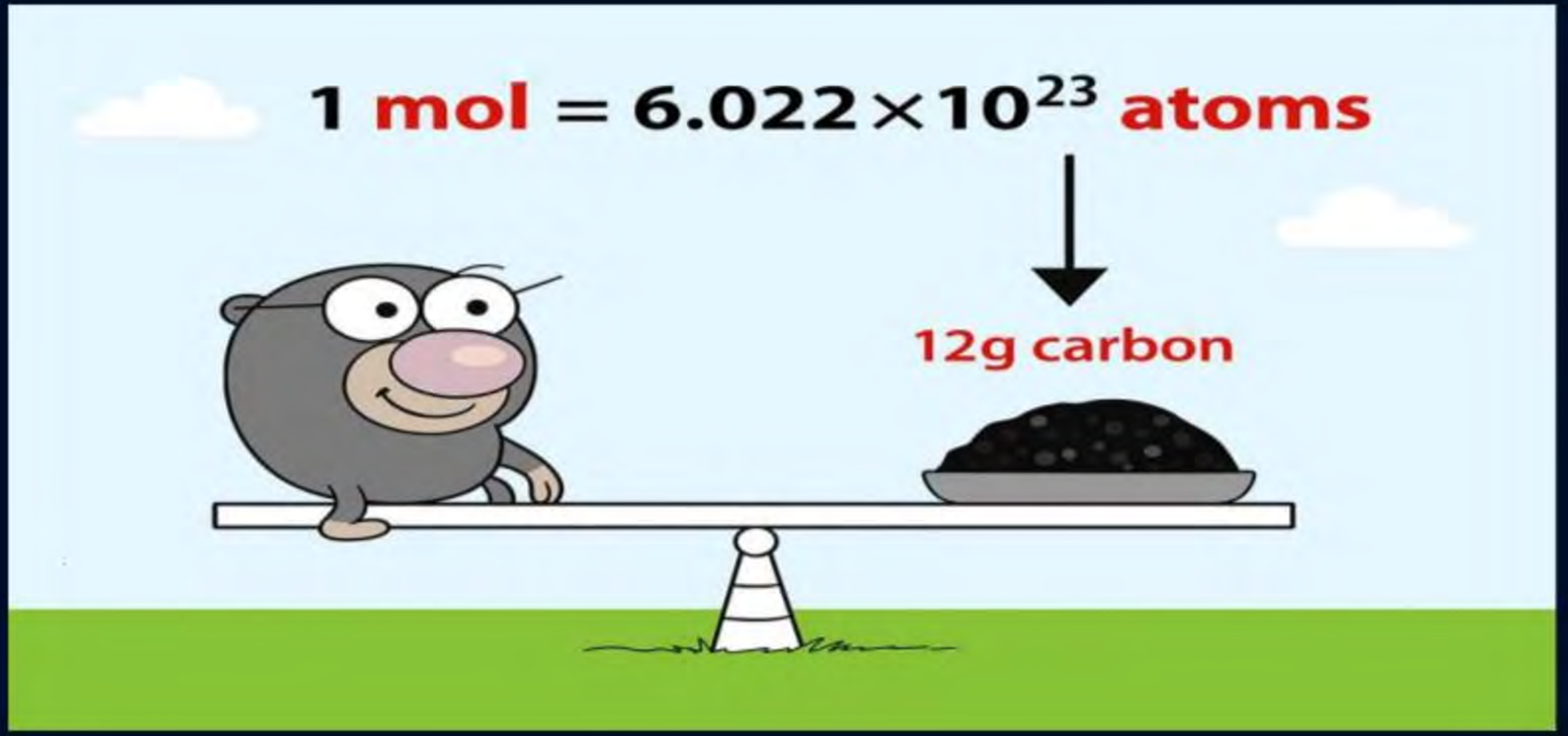
$$\text{av. at. mass} = \frac{\Sigma \text{ \% age} \times \text{at. mass}}{100}$$

$$1 \text{ mol} = N_A = 6.022 \times 10^{23}$$





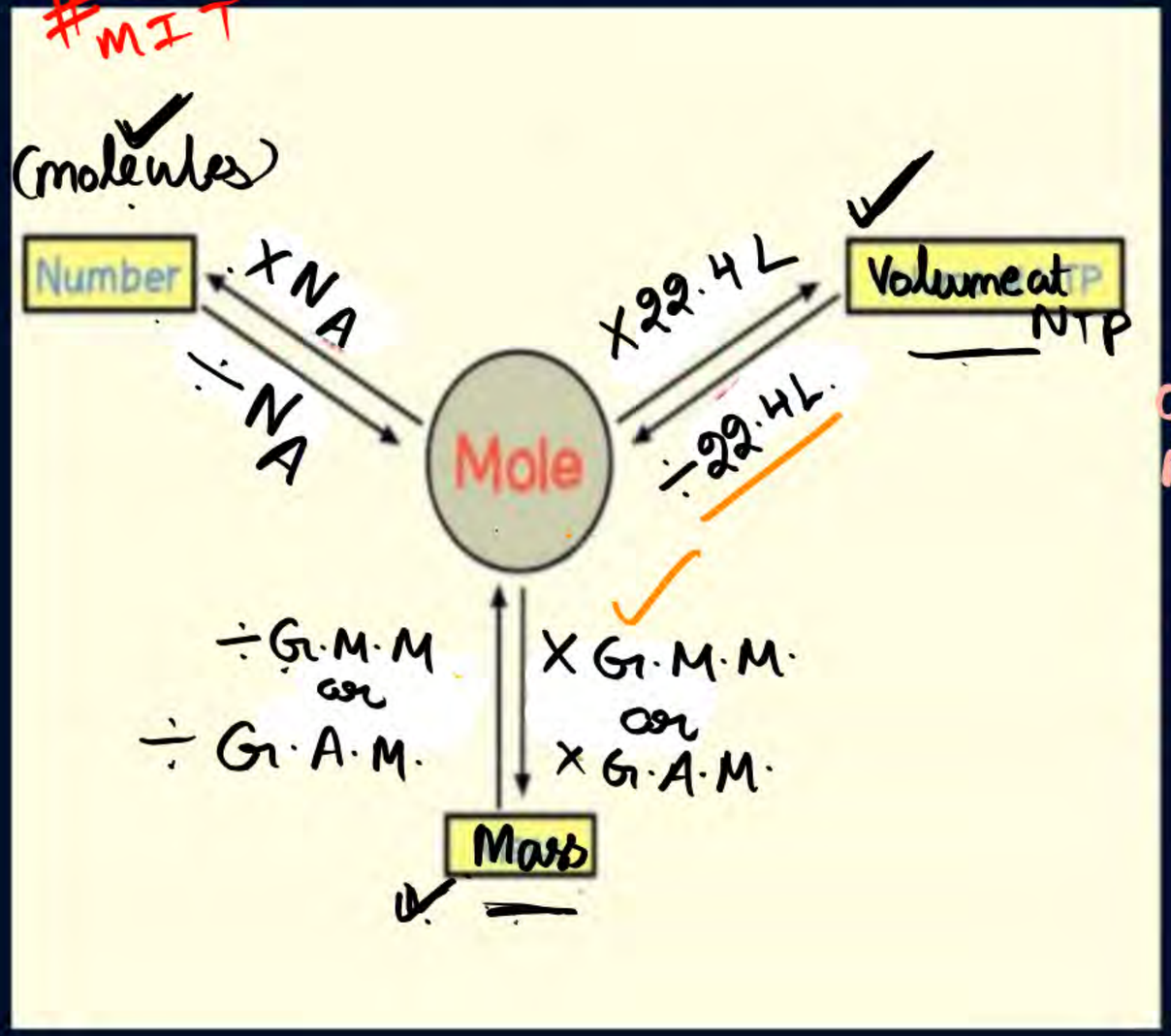



1 mol = 6.022×10^23 atoms
12g carbon

How to Find No of Moles (n)

mass, molecules, Vol. of gas at NTP/STP

#MIT



NTP = Normal temp & Pressure

STP = Std. ~~~~~

Old NCERT: T = 273 K, P = 1 atm → 1 mol Vol. 22.4 L

New NCERT: T = 273 K, P = 1 bar → 22.7 L

Question

Find the number of moles in:

n

(A) 68 g of NH_3 (molar mass of NH_3 = 17 g) (G.M.M.) $\frac{68}{17} = 4$

(B) 18.066×10^{23} molecules of CO_2 $3\frac{18.066 \times 10^{23}}{6.022 \times 10^{23}} = 3$

(C) 67.2 L at N.T.P/S.T.P. of CO_2(g) $\frac{67.2}{22.4}^{3} = 3$

(D) 45.4 L of CH_4(g) at N.T.P. (T = 273 K, P = 1 bar) $\frac{45.4}{22.7}^{2} = 2$

$$\text{Moles}(n) = \frac{\text{mass}}{\text{G.M.M.}} = \frac{\text{molecules no.}}{N_A} = \frac{\text{Vol. of gas NTP}}{22.4\,\text{L.}}$$

Question

Find the number of molecules in 68g of NH_3. (Molar mass NH_3 = 17 g/mole)

Ans $n = \frac{68}{17} = 4$

Molecules $= 4N_A$

$= 4 \times 6.022 \times 10^{23}$

$= 24.088 \times 10^{23}$

Question

Find mass of 44.8 L of C_2H_6 at N.T.P.

$^{12}_{6}C$, $^{1}_{1}H$

G.M.M. of C_2H_6 $= 2 \times 12 + 6 \times 1$

$= 30\,g$

Ans $n = \frac{44.8\ L}{22.4\ L} = 2$

mass $= 2 \times$ G.M.M. $= 2 \times 30 = 60\,g$

Question

Find volume of 24.088×10^{24} molecules of CO at N.T.P. (Molar mass of CO = 28 g)

① $n = \frac{24.088 \times 10^{24}}{6.022 \times 10^{23}} = 40$

② Vol. at N.T.P. = 40 × 22.4 L

= 896 L

Q find moles in 54L of H_2O at room temp

↓

T = 298 K

$H_2O(l)$

$d_{H_2O} = 1\ g/ml$

1L = 1000ml

54L = 54000ml

Ans $n = \frac{\text{Vol gas at NTP}}{22.4\ L}$

^{1}H ^{16}O

^{1} $_{8}$

$M_{H_2O} = 2\times1 + 1\times16$

$= 18g$

(g) mass = Volume(ml) X density (g/ml)

$= 54000 \times 1 = 54000\ g$ ✓

$n = \frac{54000}{18} = 3000$

gram atoms

(g - atoms)

MIT

$$g\text{-atoms} = \frac{\text{mass}}{\text{G.A.M.}}$$

$$g\text{-molecules (mole)} = \frac{\text{mass}}{\text{G.M.M.}}$$

$$g\text{-ions} = \frac{\text{mass}}{\text{G.F.M.}}$$

Question

Find the number of g-atoms

(a) 70 g of Nitrogen; $^{14}_{7}N$

(b) 288 g of Sulphur; $^{32}_{16}S$

(c) 560 g of Fe; $^{56}_{26}Fe$

g-atoms

$\frac{70}{14} = 5$

$\frac{288}{32} = 9$

$\frac{560}{56} = 10$

Question

Find the Gram molecules (moles) in

(a) 84g of CO; (Molar mass of CO = 28gm)

$$n = \frac{84}{28} = 3$$

Find the Gram ions in

(a) 28 g of Li^+ ^7_3Li

$$g\text{-ions} = \frac{28}{7} = 4$$

MIT

Moles same = molecules same
- → atoms same if atomicity same.
- → atoms different

120g of NO ✓✓

Q Find molecules in 112g of CO & 176g of CO_2 (different)

G.M.M NO = 30g
G.M.M CO = 28g
CO_2 = 44g

Ans

$n_{CO} = \frac{112}{28} = 4$

molecules CO = $4 \times N_A$

total atoms CO = $4N_A \times 2 = 8N_A$

$n_{NO} = \frac{120}{30} = 4$

NO = $4N_A$

total atoms NO = $4N_A \times 2 = 8N_A$

$n_{CO_2} = \frac{176}{44} = 4$

molecules CO_2 = $4 \times N_A$

total atoms CO_2 = $4N_A \times 3 = 12N_A$

Question

$^{16}_{8}O$

	n	molecules	atoms
O_2	$\frac{16}{32}=\frac{1}{2}$	$\frac{1}{2}\times N_A$	$2\times\frac{1}{2}\times N_A = N_A$
O_3	$\frac{16}{48}=\frac{1}{3}$	$\frac{1}{3}\times N_A$	$3\times\frac{1}{3}\times N_A = N_A$

Statement-I: 16g each O_2 and O_3 contains $\frac{N_A}{2}$ and $\frac{N_A}{3}$ atoms respectively.

Statement-II: 16 g O_2 and O_3 contains same no. of atoms

(A) Statement-I is true, Statement-II is true; Statement-II is correct explanation for Statement-I.

(B) Statement-I is true, Statement-II is true; Statement-II is not a correct explanation for Statement-I.

(C) Statement-I is true, Statement-II is false

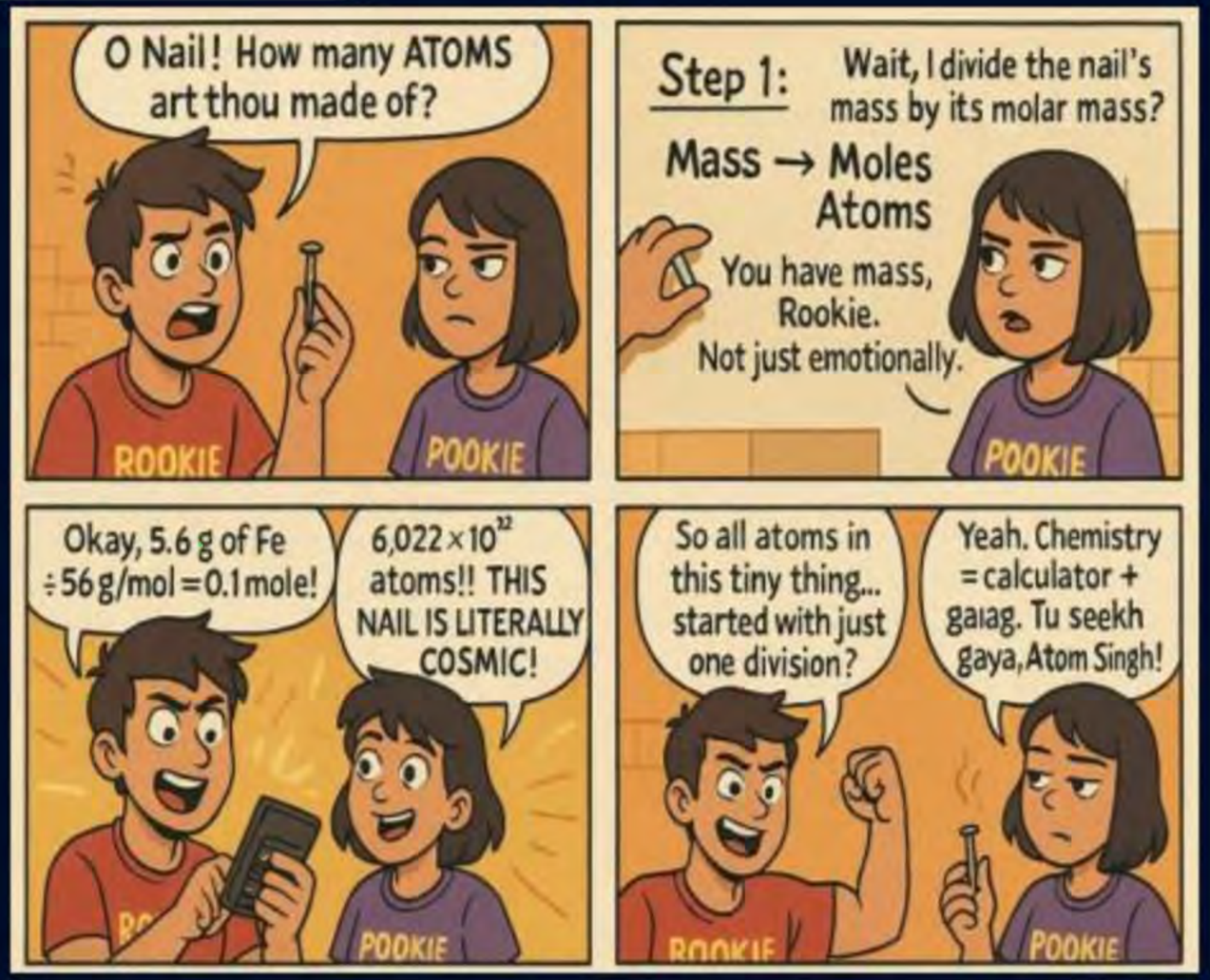
(D) Statement-I is false, Statement-II is true

Find no of atoms if anything is given

#MIT

$$\text{atoms} = n \times N_A \times \text{atomicity}$$

C_2H_6



Question (PYQ)

Which one of the followings has maximum number of atoms?

A. 1 g of $Ag_{(s)}$ [Atomic mass of Ag = 108]

B. 1 g of $Mg_{(s)}$ [Atomic mass of Mg = 24]

C. 1 g of $O_{(g)}$ [Atomic mass of O = 16]

D. 1 g of $Li_{(s)}$ [Atomic mass of Li = 7]

atoms

$\frac{1}{108} \times N_A \times 1$

$\frac{1}{24} \times N_A \times 1$

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

$\frac{1}{7} \times N_A \times 1$

Question

$^{12}_{6}C$, $^{1}_{1}H$

$M_{C_2H_6} = 2 \times 12 + 6 \times 1 = 30g$

Find no of atoms of C , H & total atoms in 90 gm of C_2H_6 ?

atoms $C = \frac{90}{30} \times N_A \times 2 = 6N_A$

$H = \frac{90}{30} \times N_A \times 6 = 18N_A$

Total atoms $= 3 \times N_A \times 8 = 24N_A$

Question

$\frac{70}{14} \times N_A = 5N_A$

Number of atoms in 560 g of Fe (atomic mass = 56 g mol^{-1}) is $\frac{10}{560} \times N_A \times 1 = 10N_A$

A twice that of 70 g N_2 atomic mass of N is 14 $\frac{5}{70} \times N_A \times 2 = 5N_A$

B half that of 20 g H_2 atomic mass of H is 1 $\frac{20}{2} \times N_A \times 2 = 20N_A$

C Both (A) and (B)

D None of these

Question

^{4}He, ^{23}Na, ^{40}Ca

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

[NCERT Exemplar]

A. 4 g He $\frac{4}{4} \times N_A \times 1 = N_A$

B. 46 g Na $\frac{46}{23} \times N_A \times 1 = 2N_A$

C. 0.40 g Ca $\frac{0.4}{40} \times N_A \times 1 = 0.01 N_A$

D. 12 g He ✓ $\frac{12}{4} \times N_A \times 1 = 3N_A$

Question

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

(NEET 2018)

A. 18 mL of water ($H_2O(l)$) $\frac{18 \times 1}{18} \times N_A$

B. 0.18 g of water $\frac{0.18}{18} \times N_A$

C. 0.00224 L of water vapour at 1 atm and 273 K $\frac{0.00224}{22.4} \times N_A$

D. 10^{-3} mol of water $10^{-3} \times N_A$

Question

O_2 N_2

The ratio of masses of oxygen and nitrogen in a particular gaseous mixture is 1 : 4. The ratio of the number of their molecules is (JEE Main 2014)

A 3 : 16

B 1 : 4

C 7 : 32

D 1 : 8

$$\frac{n_{O_2} \times N_A}{n_{N_2} \times N_A} = \frac{1 \times N_A \times 28}{32 \times 4 \times N_A} = \frac{7}{32}$$

^{14}N, ^{16}O

G.M.M(N_2) = 28 g

G.M.M(O_2) = 32 g

Question

A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). What is the molar ratio of the two gases in the mixture? (AIPMT 2015)

molar → moles

$$\frac{n_{H_2}}{n_{O_2}} = \frac{1 \times 32^{8}}{2 \times 4} = \frac{4}{1}$$

A) 16 : 1

B) 2 : 1

C) 1 : 4

D) 4 : 1 ✓

Question

The number of atoms in 0.1 mol of a triatomic gas is ($N_A = 6.02 \times 10^{23}\ mol^{-1}$)

A. 1.800×10^{22}

B. 6.026×10^{22}

C. 1.806×10^{23}

D. 3.600×10^{23}

$$\text{atoms} = 0.1 \times N_A \times 3$$

$$= 0.1 \times 6.022 \times 10^{22} \times 3$$

$$= \frac{18.066 \times 10^{22}}{10} \times 10$$

$$= 1.8066 \times 10^{23}$$

Question

One mole of CO_2 contains

A 6.02×10^{23} atoms of C → $1 \times N_A \times 1$

B 6.02×10^{23} atoms of O → $1 \times N_A \times 2$

C 18.1×10^{23} molecules of CO_2 → $1 \times N_A$

D 3 g atoms of CO_2

Question

The number of water molecules is maximum in:

A. 18 gram of water $\frac{18}{18} \times N_A = N_A$

B. 18 moles of water $18 \times N_A = 18 N_A$

C. 18 molecules of water 18

D. 1.8 gram of water $\frac{1.8}{18} \times N_A = 0.1 N_A$

Question # NIT

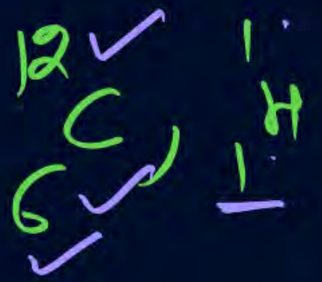
Total protons $= n \times N_A \times$ protons in 1 molecule
— e^- $= n \times N_A \times$ electrons
— neutrons $= n \times N_A \times$ neutrons

Find the

(a) number of molecules in 48g of CH_4? (Molar mass of CH_4 16).

(b) number of atoms of each element in 48 g of CH_4?

(c) Number of electrons, protons & neutrons in 48 g of CH_4?



(a) $\frac{48}{16} \times N_A = 3N_A$

(b) $3N_A \times 5 = 15N_A \rightarrow$ Total atoms

C atoms $= 3N_A \times 1 = 3N_A$
H — $= 3N_A \times 4 = 12N_A$

(c) Total p $= 3N_A \times (6 \times 1 + 1 \times 4) = 30N_A$
— $e^- = 30N_A$
— n $= 3N_A \times ((12-6) \times 1 + (1-1) \times 4) = 3N_A \times 6 = 18N_A$

Q. find e, p, n in 192 g of SO_4^{2-} ($^{32}_{16}S$ $^{16}_{8}O$)

Ans (a) Total p = $\frac{192}{96} \times N_A \times (16\times1 + 4\times8) = 96N_A$

G.F.M of SO_4^{2-}
$= 1\times32 + 4\times16$
$= 96$

(b) — neutrons = $2N_A \times (16\times1 + 8\times4) = 96N_A$

(c) — electrons = $2N_A [48 + 2] = 100N_A$

$A_x B_y$

1 molecule of $A_x B_y$ has A atoms = x

B ~~~ = y

#MIT

1 mole of $A_x B_y$ has A moles atoms = $\frac{1 \times N_A \times x}{N_A} = x$

1 ~~~ B ~~~ = y

Question

How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms?

A. 0.02

B. 3.125×10^{-2}

C. 1.25×10^{-2}

D. 2.5×10^{-2}

1 mole $Mg_3(PO_4)_2$ ← 8 mole oxygen atoms

← i

$\frac{1}{8}$

← 0.25

$\frac{1 \times 0.25}{8 \times 100} = \frac{1}{32} = 0.03125 = 3.125 \times 10^{-2}$

Home work from modules

Train your brain → 9, 10, 11, 12

Concept application → 9, 10, 11, 12

Prarambh → 15 to 36

Prabal → 1, 4, 6, 13

PYQ → 1, 6, 7, 10, 11, 12

Tricks for fast Calculations

efficiency ↑ ← Time Bound study.

Pomodoro Technique.

50 for

25 min → Alarm → study full focus. → 5 min. rest → no digital X

25 min →

4 repeat → long break → 30 min.

Magarmach Practice Questions (MPQ)

Question

Statement-I: Both 12g of carbon and 27 g of aluminium will have 6.02×10^{23} atoms.

Statement-II: Gram atomic mass of an element contains Avogadro's number of atoms

A. Statement-I is true, Statement-II is true; Statement-II is correct explanation for Statement-I.

B. Statement-I is true, Statement-II is true; Statement-II is not a correct explanation for Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true

Question

Statement-I: One atomic mass unit is defined as one twelfth of the mass of one carbon-12 atoms.

Statement-II: Carbon-12 isotopes is the most abundant isotope of carbon and has been chosen as standard.

A. Statement-I is true, Statement-II is true; Statement-II is correct explanation for Statement-I.

B. Statement-I is true, Statement-II is true; Statement-II is not a correct explanation for Statement-I.

C. Statement-I is true, Statement-II is false

D. Statement-I is false, Statement-II is true

Question

What is the mass of a water molecule in gram? How many molecules are present in one drop of pure water which weighs 0.05 g? If the same drop of water evaporates in one hour, calculate the number of molecules leaving the liquid surface per second.

Question

The weight of a molecule of the compound $C_{60}H_{122}$ is

A 1.4×10^{-21} g

B 1.09×10^{-21} g

C 5.025×10^{23} g

D 16.023×10^{23} g

Question

Which has the maximum number of molecules among the following ? Molar mass of $CO_2 = 44$ g,

A. 44 g of CO_2

B. 48 g O_2

C. 8 g H_2

D. 64 g SO_2

Question

The ratio of masses of oxygen and nitrogen in a particular gaseous mixture is 1 : 4. The ratio of number of their molecule is

A 1 : 4

B 7 : 32

C 1 : 8

D 3 : 16

Question (NCERT: PL-18 | JEE Main April 10, 2023 (I)

The number of molecules are moles in 2.8375 litres of O_2 at STP are respectively

(A) 7.527×10^{22} and 0.250 mol

(B) 1.505×10^{23} and 0.250 mol

(C) 7.527×10^{23} and 0.125 mol

(D) 7.527×10^{22} and 0.125 mol

Question (NCERT: PL-18 | JEE Main April 10, 2023 (II))

Match List I with List II:

	List – I		List – II
A.	16g of $CH_4(g)$	I.	Weighs 28 g
B.	1 g of $H_2(g)$	II.	60.2×10^{23} electrons
C.	1 mole of $N_2(g)$	III.	Weighs 32 g
D.	0.5 mol of $SO_2(g)$	IV.	Occupies 11.4 L volume at STP

Choose the correct answer from the options given below :

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

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

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

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

Question (NCERT: PL-18 | JEE Main April 3, 2025 (I)

Among 10^{-9} g (each) of the following elements, which one will have the highest number of atom? Element : Pb, Po, Pr and Pt

(A) Po

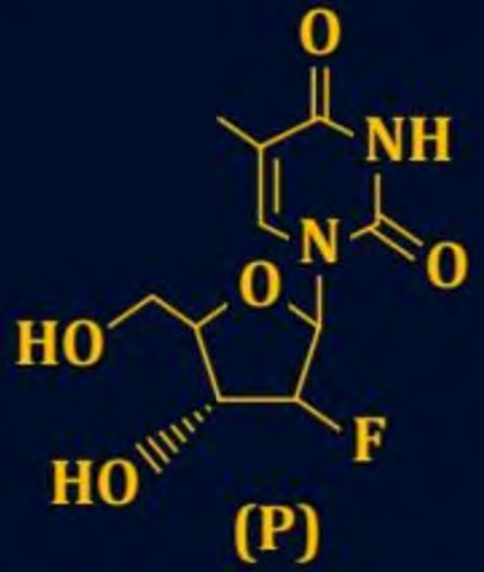
(B) Pt

(C) Pb

(D) Pt

Question (NCERT: PL-18 | NV, JEE Main April 2, 2025 (I))

0.1 mol of the following given antiviral compound (P) will weigh _____ $\times 10^{-1}$ g
(Given : molar mass in g mol^{-1} H : 1, C : 12, N : 14, O : 16, F : 19, I : 127)



(P)

Question (NCERT: PL-23 | NV, JEE Main June 27, 2022 (I))

Two elements A and B which from 0.15 moles of A_2B and AB_3 type compounds. If both A_2B and AB_3 weigh equally, then the atomic weight of A is _____ times of atomic weight of B.

Question (NCERT: PL-18 | NV, JEE Main June 25, 2022 (I))

The number of N atoms in 681 g of $C_7H_5N_3O_6$ is $x \times 10^{21}$. The value of x is _____ ($N_A = 6.02 \times 10^{23}\ mol^{-1}$) (Nearest Integer)

Question (NCERT: PL-18 | JEE Main April 12, 2019 (I)

5 moles of AB_2 weigh 125×10^{-3} kg and 10 moles of A_2B_2 weigh 300×10^{-3} kg. The molar mass of A (M_A) and molar mass of B(M_B) in kg mol^{-1} are :

(A) $M_A = 10 \times 10^{-3}$ and $M_B = 5 \times 10^{-3}$

(B) $M_A = 50 \times 10^{-3}$ and $M_B = 25 \times 10^{-3}$

(C) $M_A = 25 \times 10^{-3}$ and $M_B = 50 \times 10^{-3}$

(D) $M_A = 5 \times 10^{-3}$ and $M_B = 10 \times 10^{-3}$

THANK YOU