YAKEEN NEET 2.0

2026

Some Basic Concept of Chemistry

Physical Chemistry | Lecture -04

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Topics to be covered

1. Revision of Last Class
2. Isotopes, Isobars, Isotones, Isodiaphers & Isoelectronic Ions
3. Average Atomic Mass, Mole concept
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

$^{23}_{11}Na$

		atoms
R.A.M.	23	1
A.A.M.	23amu	1
Gr.A.M.	23g	N_A

1 a.m.u. = $\frac{1}{12}$ of mass of atom of C-12

1 a.m.u. Changed ⇒ R.A.M. will Change
R.M.M ,, ,,
R.F.M ,, ,,

$A' = A \times \frac{x}{12}$

Q. Find new R.F.M. of Na^+Cl^- if a.m.u. is defined as $\frac{1}{6}^{th}$ of 1 atom of C-12 ($^{23}_{11}Na$, $^{35.5}_{17}Cl$)

$A = 23 + 35.5 = 58.5$

Ans $A' = A \times \frac{x}{12}$

$= 58.5 \times \frac{6}{12}$

$= 29.25$

#MIT

if 1 a.m.u. definition Change → R.A.M., R.M.M & R.F.M. will Change.

but A.A.M, A.M.M & A.F.M → will not Change.

& G.A.M, G.M.M & G.F.M

$^{23}_{11}Na$

R.A.M. = 23

A.A.M. = 23 u

G.A.M. = 23 g

G.A.M. = (R.A.M.) g

Bhagwan

Mere paise = Tumhare paise

G.A.M = R.A.M

if 1 a.m.u = $\frac{1}{12} \times \frac{12}{N_A}$ $\quad \frac{4}{2} \times 2$

$$R.A.M = \frac{\text{mass of 1 atom}}{\frac{1}{12} \times \frac{12}{N_A}}$$

$$A.A.M = \frac{\text{mass of 1 atom}}{\frac{1}{12} \times \frac{12}{N_A}} \times \frac{1}{12} \times \frac{12}{N_A}$$

$$G.A.M = \frac{\text{mass of 1 atom}}{\frac{1 \times 12}{12 \quad N_A}} \times 1 \times \frac{12}{12} \times N_A$$

G.A.M = (R.A.M)ing

Bhagwan

Mere paise ≠ Tumhare paise

G.A.M ≠ R.A.M

1 a.m.u = $\frac{1}{x} \times \frac{12}{N_A}$

new

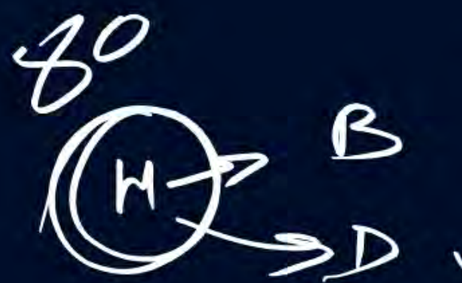
$$R.A.M = \frac{\text{mass of 1 atom}}{\frac{1}{x} \times \frac{12}{N_A}}$$

new

$$A.A.M = \frac{\text{mass atom}}{\frac{1}{x} \times \frac{12}{N_A}} \times \frac{1}{x} \times \frac{12}{N_A}$$

new

$$G.A.M = \frac{\text{mass of 1 atom}}{\frac{1}{x} \times \frac{12}{N_A}} \times \frac{1}{x} \times \frac{12}{N_A} \times N_A$$



Relative marks H as Compared to B $= \frac{80}{20} = 4$

$D = \frac{80}{40} = 2$

Q. If 1 a.m.u. is $\frac{1}{6}$ of 1 atom of C-12.
which will change

(a) R.A.M.

(b) A.A.M.

(c) G.A.M. (Molar mass)

(d) All of these.

#MIT

Gr·A·M· (Molar mass) = mass of 1 atom × N_A ✓

if N_A Changed ∴ Gr·A·M· will Change ✓
or
Gr·M·M ✓
or
Gr·F·M ✓

$10^2 = 100$

Q If $N_A' = 6.022 \times 10^{25}$ find new Gr·A·M· of O ?

Ans
old Gr·A·M· = 16g
6.022×10^{23} atoms mass = 16g

1 atom mass = $\frac{16}{6.022 \times 10^{23}}$ g

6.022×10^{25} atoms mass = $\frac{16}{6.022 \times 10^{23}} \times 6.022 \times 10^{25}$

$= 1600$g

Q: If $N_A' = 12.044 \times 10^{23}$ find new G.M.M. of O_2?

$^{16}_{8}O$

Ans Old G.M.M. $= 16 \times 2 = 32g$

6.022×10^{23} molecules mass $O_2 = 32g$

1 ——— $= \frac{32}{6.022 \times 10^{23}}$

12.044×10^{23} ——— $= \frac{32}{6.022 \times 10^{23}} \times 12.044 \times 10^{23} = 64g$

OM

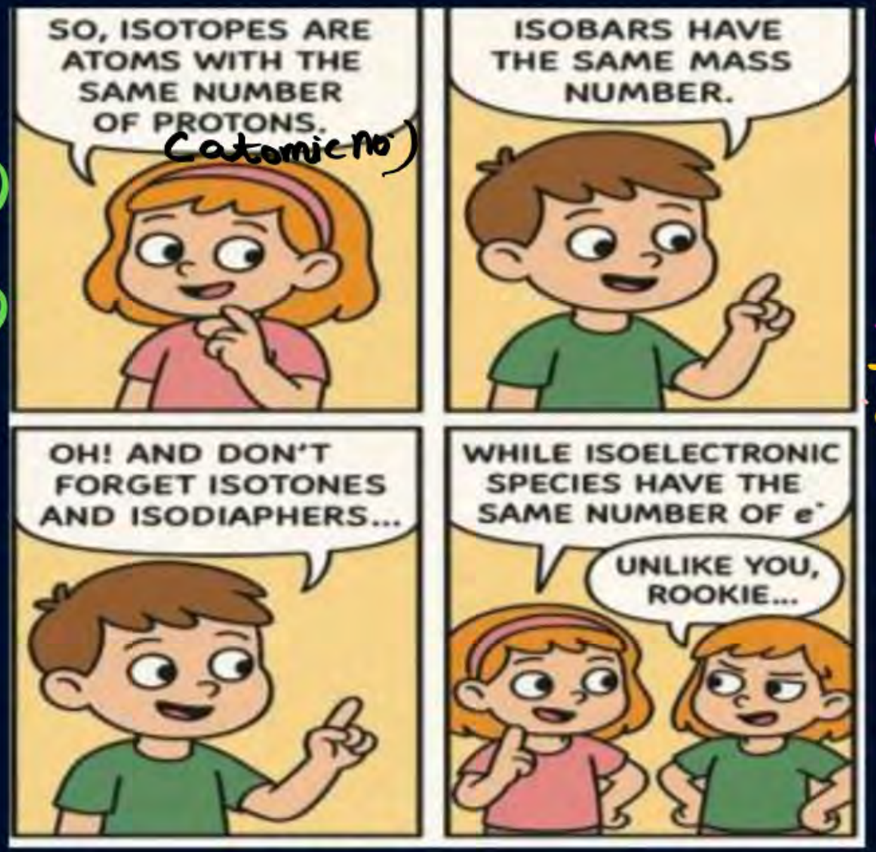
Isotopes, Isobars, Isotones, Isodiaphers & Isoelectronic

$^{12}_{6}C$ & $^{14}_{6}C$

$^{1}_{1}H$

$^{2}_{1}H$ (D)

$^{3}_{1}H$ (T)



$^{14}_{6}C$ & $^{14}_{7}N$

	$^{14}_{6}C$	$^{16}_{8}O$
Neutrons	14-6=8	16-8=8

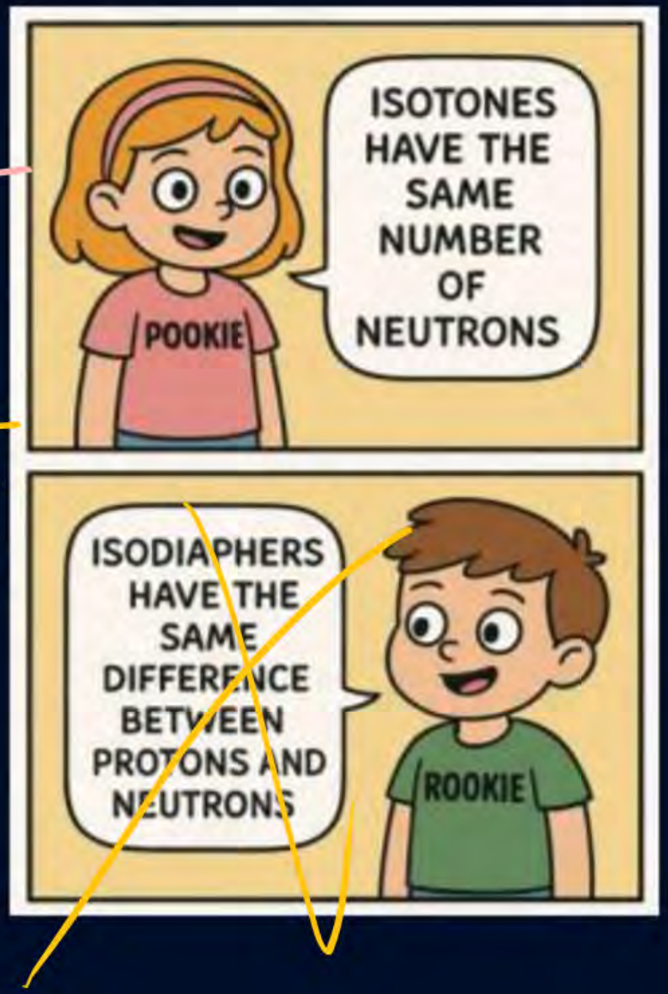
Isodiaphers → A-2Z = same

$A - 2Z$ = same

$^{234}_{90}Th$ & $^{238}_{92}U$

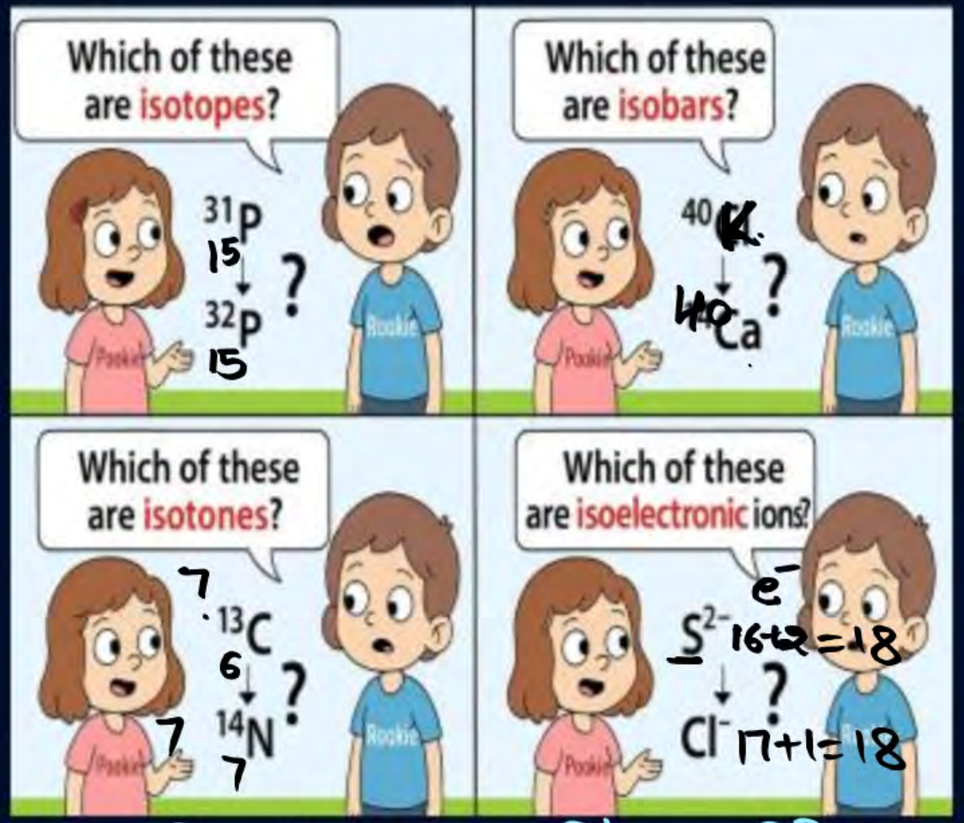
$234 - 2\times90 = 54$

$238 - 2\times92 = 54$



Isoelectronic : same no. of electrons

	Z	e^-
Al^{3+}	13	13 - 3 = 10
Mg^{2+}	12	12 - 2 = 10
Na^{+}	11	11 - 1 = 10
F^{-}	9	9 + 1 = 10
O^{2-}	8	8 + 2 = 10
N^{3-}	7	7 + 3 = 10



1. Which of the following are isotopes?

(A) $^{1}H, ^{2}H$ (B) $^{12}C, ^{14}N$

(C) $^{16}O, ^{14}N$ (D) $^{40}Ca\ ^{40}K$

2. Which of the following are isobars?

(A) ^{23}Na (B) $^{32}S, ^{4}S$

(C) ^{40}Ca (D) $^{15}C, ^{16}N$

3. Which of the following are isotones?

(A) $^{12}C, ^{14}N$ (B) $^{40}Ar, ^{40}Ca$

(C) $^{31}P, ^{32}S$ (D) $^{40}K, ^{40}Ar$

4. Which of the following are isoelectronic species?

(A) O^{2-}, F^{-} (B) $Na^{+}\ Cl^{-}$

(C) CO_2, NO (D) $NH_3\ CH_4$

Q. H Isoelectronic e^-

(a) $\underset{10}{O^{2-}}$, $\underset{10}{F^-}$

$^{16}_{8}O$, $^{19}_{9}F$

$^{23}_{11}Na$ $^{35}_{17}Cl$

$^{12}_{6}C$, $^{14}_{7}N$

$^{1}_{1}H$

(b) $\underset{10}{Na^+}$, $\underset{18}{Cl^-}$

(c) CO_2, NO

$e^- = 6 + 2\times8 = 22$

$7\times1 + 8\times1 = 15$

(d) CH_4, NH_3

e^- $6\times1 + 1\times4 = 10$

$7\times1 + 1\times3 = 10$

Average Atomic Mass

① average mass of all isotopes of same element :

for ex : $^{35}_{17}Cl$ ✓ & $^{37}_{17}Cl$ ✓

② Av. at. mass $= \frac{\sum \text{\%age} \times \text{at. mass}}{100}$

Average

	no	weight (g)
Ladoo	40	30
Barfi	60	40

average mass of 1 mithai piece

$$= \frac{40 \times 30 + 60 \times 40}{100}$$

$$= \frac{1200 + 2400}{100} = \frac{3600}{100} = 36g$$

Question (NEET 2007)

18000
1996
19996

An element, X has the following isotopic composition:

^{200}X: 90% **^{199}X: 8.0%** **^{202}X: 2.0%**

The weighted average atomic mass of the naturally occurring element X is closest to

(A) 201 amu

(B) 202 amu

(C) 199 amu

(D) 200 amu

Average at. mass of $X = \frac{90 \times 200 + 8 \times 199 \times 2 \times 202}{100}$

$= \frac{18000 + 1592 + 404}{100}$

$= \frac{19996}{100} = 199.96$

Question (NEET 1990)

Boron has two stable isotopes, ^{10}B (19%) and ^{11}B (81%). Calculate average at. wt. of boron in the periodic table.

A. 10.8

B. 10.2

C. 11.2

D. 10.0

$$\text{av. at. mass} = \frac{19 \times 10 + 81 \times 11}{100} = \frac{190 + 891}{100}$$

$$= \frac{1081}{100} = 10.81$$

Question

Naturally occurring carbon consists of two isotopes $^{12}C(12)$ and $^{13}C(13)$. If atomic weight is taken as 12.01, percentage of ^{13}C is

^{12}C → x → x%

^{13}C → $(100-x)$ → $100-99 = 1$%

$$12.01 = \frac{x \times 12 + (100-x)\times 13}{100}$$

$$1201 = 12x + 1300 - 13x$$

$$1201 - 1300 = -x$$

$$+99 = +x$$

$$x = 99$$

(A) 1.10

(B) ✗ 98.90

(C) ✓ 1.00

(D) ✗ 99.00

Question (JEE Main 2020 (II) NTA)

Atomic weight of Cl is taken as 35.5. If $^{35}_{17}Cl$ and $^{37}_{17}Cl$ are two isotopes, their ratio of abundance will be

(A) 3 : 1

(B) 1 : 3

(C) 1 : 4

(D) 4 : 1

$$35.5 = \frac{x \times 35 + (100 - x) \times 37}{100}$$

$$3550 = 35x + 3700 - 37x$$

$$3550 - 3700 = -2x$$

$$+150 = +2x$$

$$x = \frac{150}{2} = 75\%$$

$$\%age = \frac{ratio}{} \times 100$$

$$\%age\ of\ Cl\text{-}35 = 75 = ratio \times 100$$

$$ratio = \frac{75}{100} = 0.75$$

$$\%age\ of\ Cl\text{-}37 = 25 = ratio \times 100$$

$$ratio = 0.25$$

$$Cl\text{-}35 : Cl\text{-}37$$

$$0.75 : 0.25$$

$$3 : 1$$

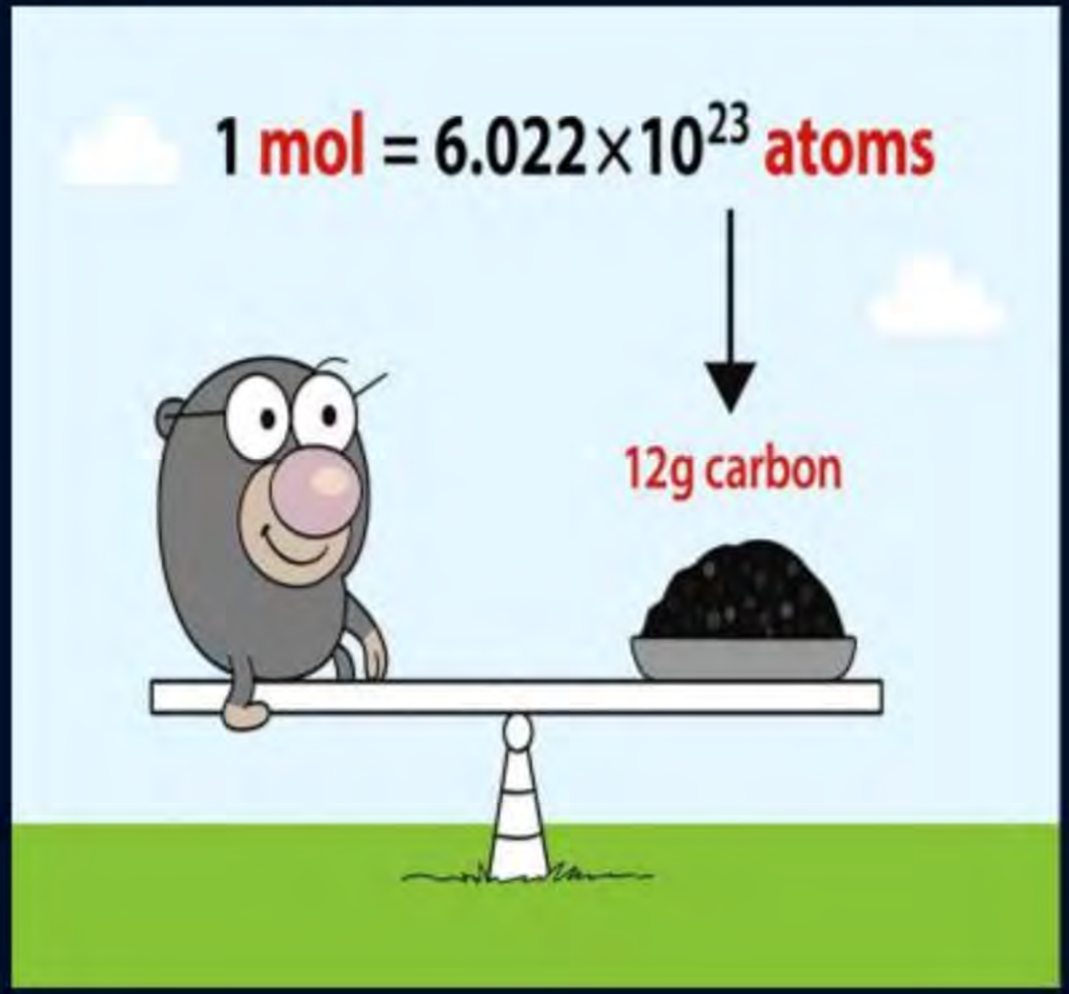
Mole (n)

	no
1 Pair	2
1 Dozen	12
1 mole	Avogadro's no $= 6.022 \times 10^{23}$ (N_A)

Gr. A.M ÷ mass of N_A atoms

$^{12}_{6}C$ 12g of C has atoms $= N_A$

mole is no. of particles present in 12g of C-12.



Home work from modules

Train your Brain → example, 1, 2, 7, 8

Concept application → Q 5, 6

Prarambh → Q 11, 12, 14

Tricks for fast Calculations

How to find Cube root :-

No :-	1	2	3	4	5	6	7	8	9	10
Cube	1	8	27	64	125	216	343	512	729	1000

Q find Cube root of 2,87,496

① groups 3 each starting from R.H.S. → 287 | 496

② Check last no. → 6 → 7 → 66

Find Cube root of 778688

9

Ans 92

10

Find Cube root of 17576

2 → 26

3

Q11 Cube root of 79507

Ans 43

Magarmach Practice Questions (MPQ)

first all 4 classes
revise
attempt

Question

Find the number of atoms in

A. 96 a.m.u. of O, $^{16}_{8}O$

B. 96 a.m.u. of C, $^{12}_{6}C$

C. 96 u of S, $^{32}_{16}S$

D. 168 u of Fe, $^{56}_{26}Fe$

Question

Find the number of molecules in:

(a) 132 a.m.u. of CO_2, (R.M.M. of CO_2 = 44)

(b) 128 a.m.u. of SO_2, $({}^{32}_{16}S, {}^{16}_{8}O)$

(c) 85 u of NH_3, (R.M.M. of NH_3 = 17)

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 (NCERT: PL-16 | JEE Main April 5, 2024 (I)

The incorrect postulates of the Dalton's atomic theory are :

(A) Atoms of different elements differ in mass.

(B) Matter consists of divisible atoms.

(C) Compounds are formed when atoms of different element combine in a fixed ratio.

(D) All the atoms of given element have different properties including mass.

(E) Chemical reactions involve reorganisation of atoms.

Choose the correct answer from the options given below :

A (B), (D), (E) only

B (A), (B), (D) only

C (C), (D), (E) only

D (B), (D) only

Question (NCERT: PL-16) JEE Main April 4, 2024 (II)

Choose the Incorrect Statement about Dalton's Atomic Theory

(A) Compound are formed when atoms of different elements combine in any ratio

(B) All the atoms of a given element have identical properties including identical mass

(C) Matter consists of indivisible atoms

(D) Chemical reactions involve recorganization of atoms

Question (NCERT: PL-16 | JEE Main Jan. 07, 2020 (I)

Amongst the following statements, that which was not proposed by Dalton was :

(A) Chemical reactions involve reorganization of atoms. These are neigher created not destroyed in a chemical reaction.

(B) All the atomso f a given element have identical properties including identical mass. Atoms of different elements differ in mass.

(C) When gases combine or reproduced in a chemical reaction they do so in a simple ratio by volume, provided all gases are at the same T and P.

(D) Matter consists of indivisible atoms.

Which of the following pairs are isotopes?

) $^{12}_{6}C$ and $^{14}_{6}C$

) $^{20}_{10}Ne$ and $^{20}_{6}Na$

) $^{35}_{17}Cl$ and $^{37}_{18}Ar$

) $^{14}_{6}C$ and $^{14}_{7}N$

Which pair of species are isobars?

(A) $^{40}_{20}Ca$ and $^{40}_{18}Ar$

(B) $^{12}_{6}C$ and $^{16}_{7}C$

(C) $^{16}_{8}O$ and $^{22}_{12}Ng$

(D) $^{22}_{11}Na$ and $^{24}_{12}Mg$

Which pair are isotones?

) $^{14}_{6}C$ and $^{15}_{7}N$

) $^{16}_{8}O$ and $^{17}_{9}F$

) $^{35}_{11}Cl$ and $^{37}_{12}Cl$

Which of the following pairs are isoelectronic

(A) Na^{+} and Ne

(B) Cl^{-} and Ar

(C) O^{2-} and F^{-}

Question

For the following isotopes of Mg, abundance is given.

I.	$^{26}_{12}Mg$	0.15
II.	$^{25}_{12}Mg$	0.05
III.	$^{24}_{12}Mg$	0.80

Which has highest number of neutrons in 24.35 g of mixture of isotopes?

(A) I

(B) II

(C) III

(D) equal

An unknown element X has three otopes: X-100, X-101, and X-102, ne mass of X-100 is 100 u, and X-102 102 u. If the average atomic mass 101,2 u and the abundances of -100 and X-102 are equal, find ne abundance (%) of X-101.

A) 20 %
B) 40 %
C) 60 %

2. An element Z exists in two isots forms Z-79 and Z-81. Its average atomic mass is 79.9 u. If the atomi mass of Z-81 is slightly uncertain (between 80.9 u and 81.1 u), which range of % abundance is certainly possible for Z-79?

(A) 50–55 %
(B) 70–75 %
(C) 85–90 %
(D) Cannot be determine without exact

Two isotopes of an element A re accidentally mixed in a labor- tory in a 2:3 molar ratio. Their tomic masses are 10 u and 12 u espectively. What is the xperimentally observeo' atomic nass of the mixture?

A) 11,0 u
(B) 11,2 u
C) 11,3 u
(D) 11,5 u

4. In a sample of element M, the isotope M-64 is found to undergo radioactive decay over time. Initial M-64 had 60% abundance and M-66 had 40 %. After decay, M-64 abundance drops to 30%. Assuming masses stay contant, ho does the **average atomic mass** of the element change?

(A) Increases
(B) Decrease
(C) Remains same
(D) First decre

THANK YOU