YAKEEN NEET 2.0

2026

Some Basic Concept of Chemistry

Physical Chemistry | Lecture -02

By- Amit Mahajan Sir

Topics to be covered

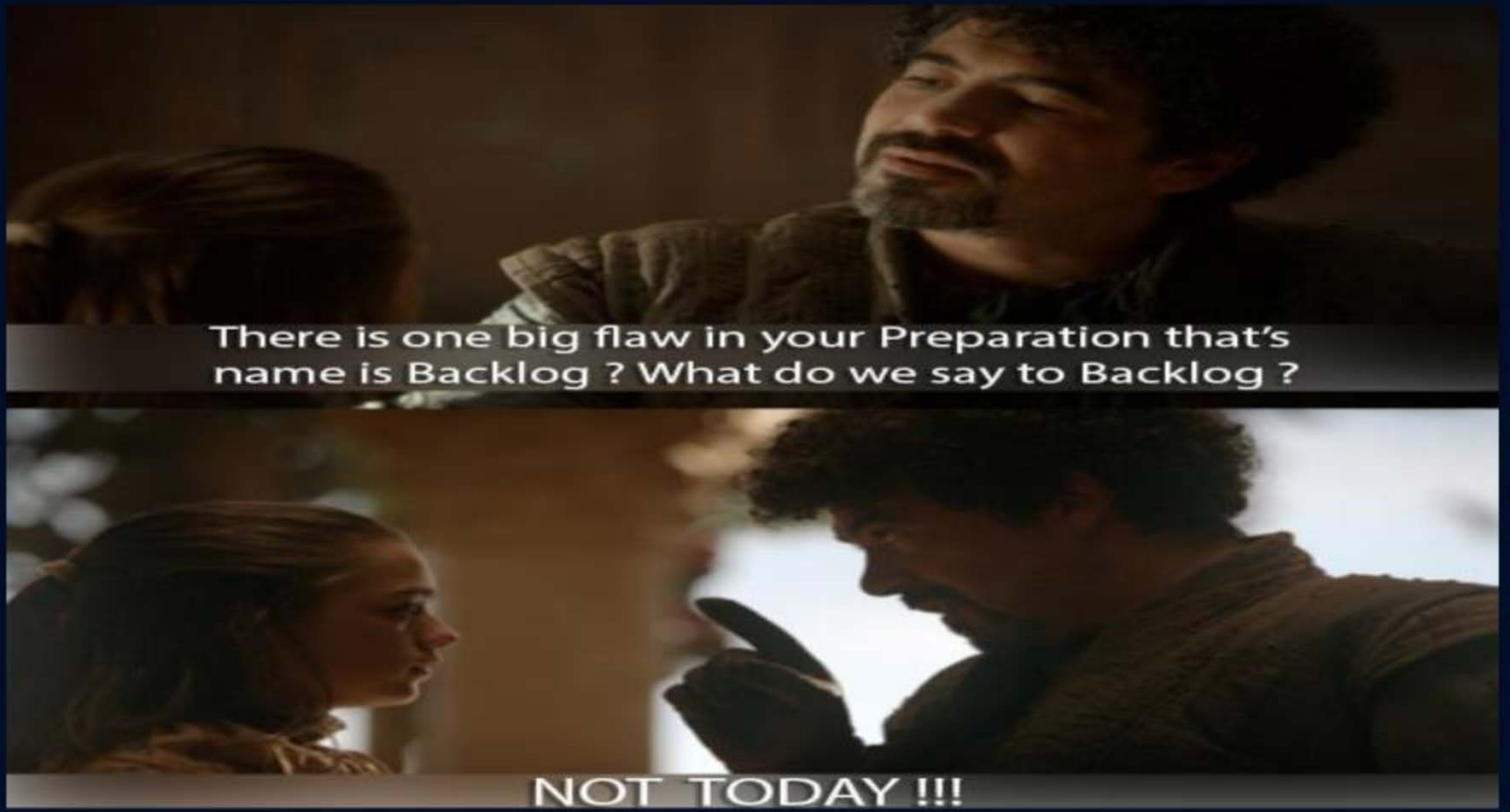
1. Revision of Last Class
2. Pure substances & mixture
3. Calculation of Subatomic particles
4. ★★★★ Trick for fast calculation
5. MPQ (Magarmach Practice Questions)

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.

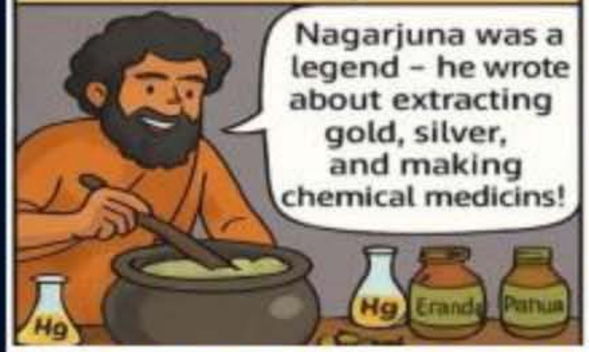
Rules to Attend Class

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 !!!

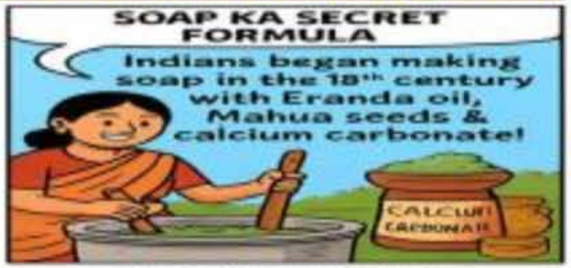
Revision of Last class

Alchemy, Metals & Soap -Making



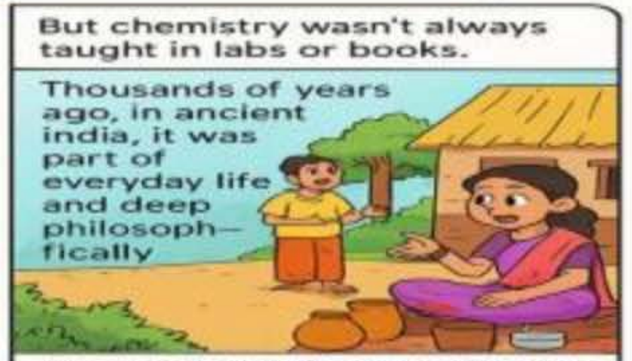
Secret Inks, Fireworks & Nanotech?!

ANCIENT INDIAN CHEMISTRY — SOAPS, SCIENCE, AND STUNNING WALLS

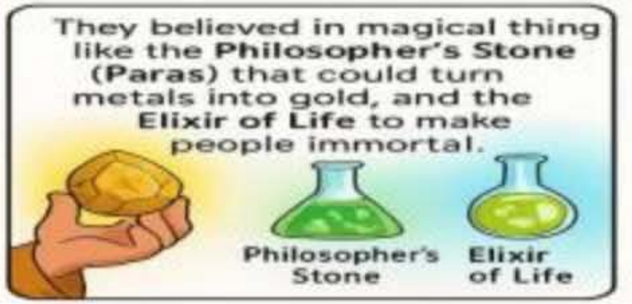


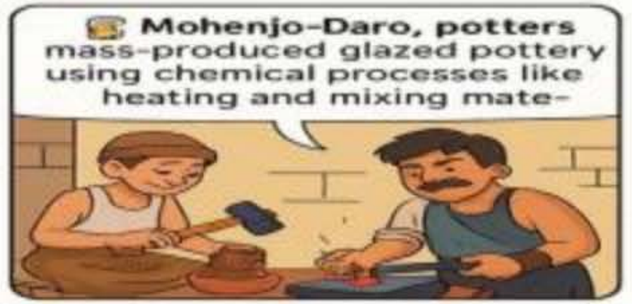
The Story of Chemistry: From Magic to Molecules

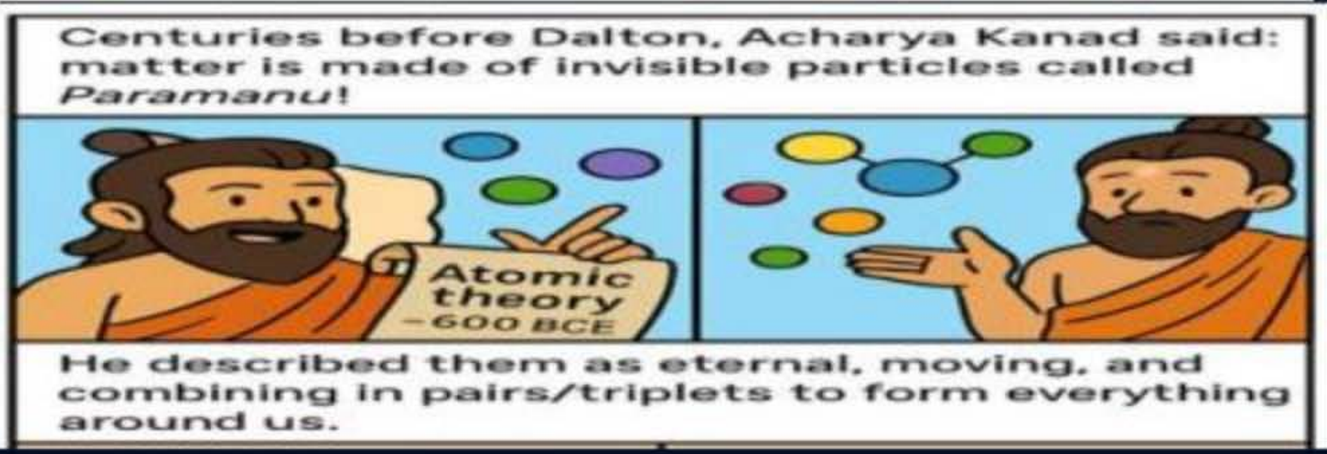
Their curiosity led to science, and one special branch of science called **Chemistry**— the study of substances, their properties, how they combine, react and and change.



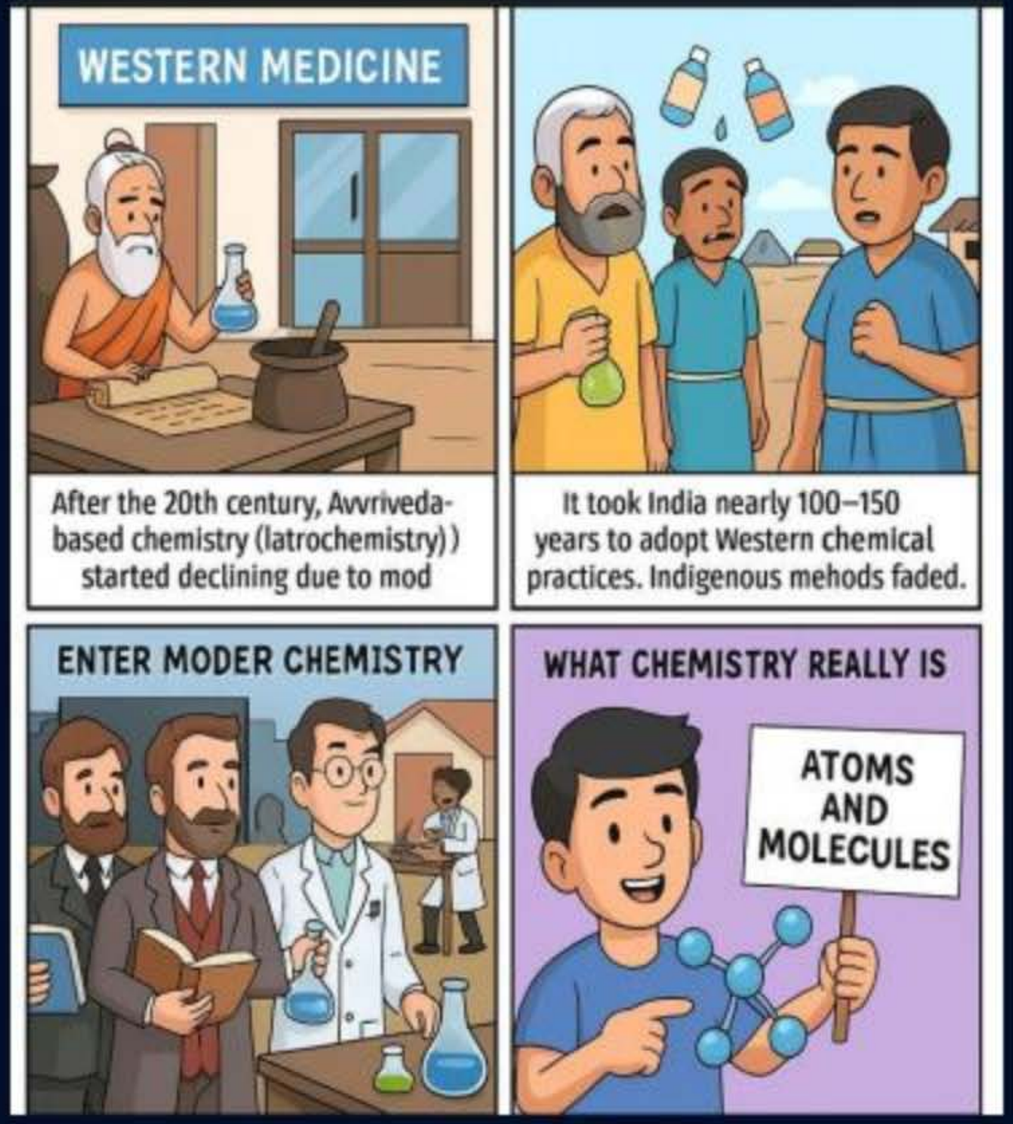
They called it **Rasayan Shastra,** and it included everything from preparing pertumes and glass to dyes and healing potions.

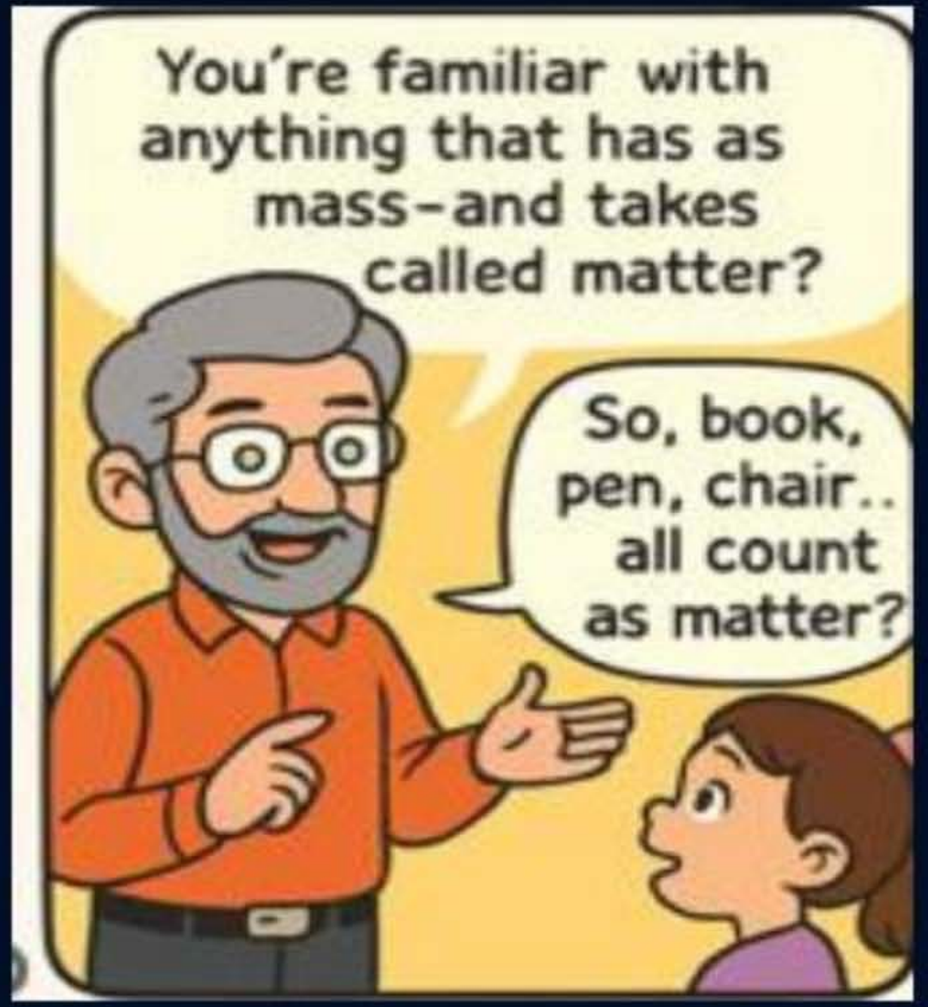






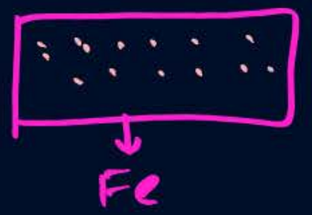

Class, today we're learning about chemical compounds used in daily life.
Daily life? Or secret superher base?
SANITIZER 70%
70% ethanol--and I still smell better than gym socks!
Fast relief in seconds, no appointment needed!
DOCTOR DOSE
Bro's faster than my Wi-Fi
Me make plants grow big! Like...SUPER big.
NPK MIX
Aree wahh, bhalya!


WESTERN MEDICINE
After the 20th century, Avvriveda-based chemistry (latrochemistry)) started declining due to mod
It took India nearly 100–150 years to adopt Western chemical practices. Indigenous mehods faded.
ENTER MODER CHEMISTRY
WHAT CHEMISTRY REALLY IS
ATOMS AND MOLECULES


You're familiar with anything that has as mass-and takes called matter?
So, book, pen, chair.. all count as matter?

Chemical Classification

Pure Substances



their all particles are same.

2 Types

① Element.

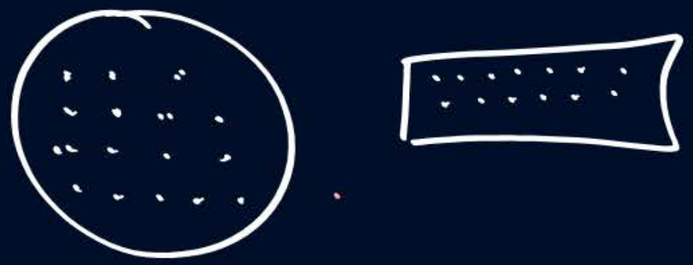
② Compound.

for ex ÷ He(g), Fe(s), $C_6H_{12}O_6(s)$

Elements → 118 elements

- **Each element has one type of atoms in it.**

He(g) , Fe(s)



Question

Which of the following pairs are both elements?

A CO and NO

B C and Cu

C NaCl and K

D H_2O and O_2

Compounds

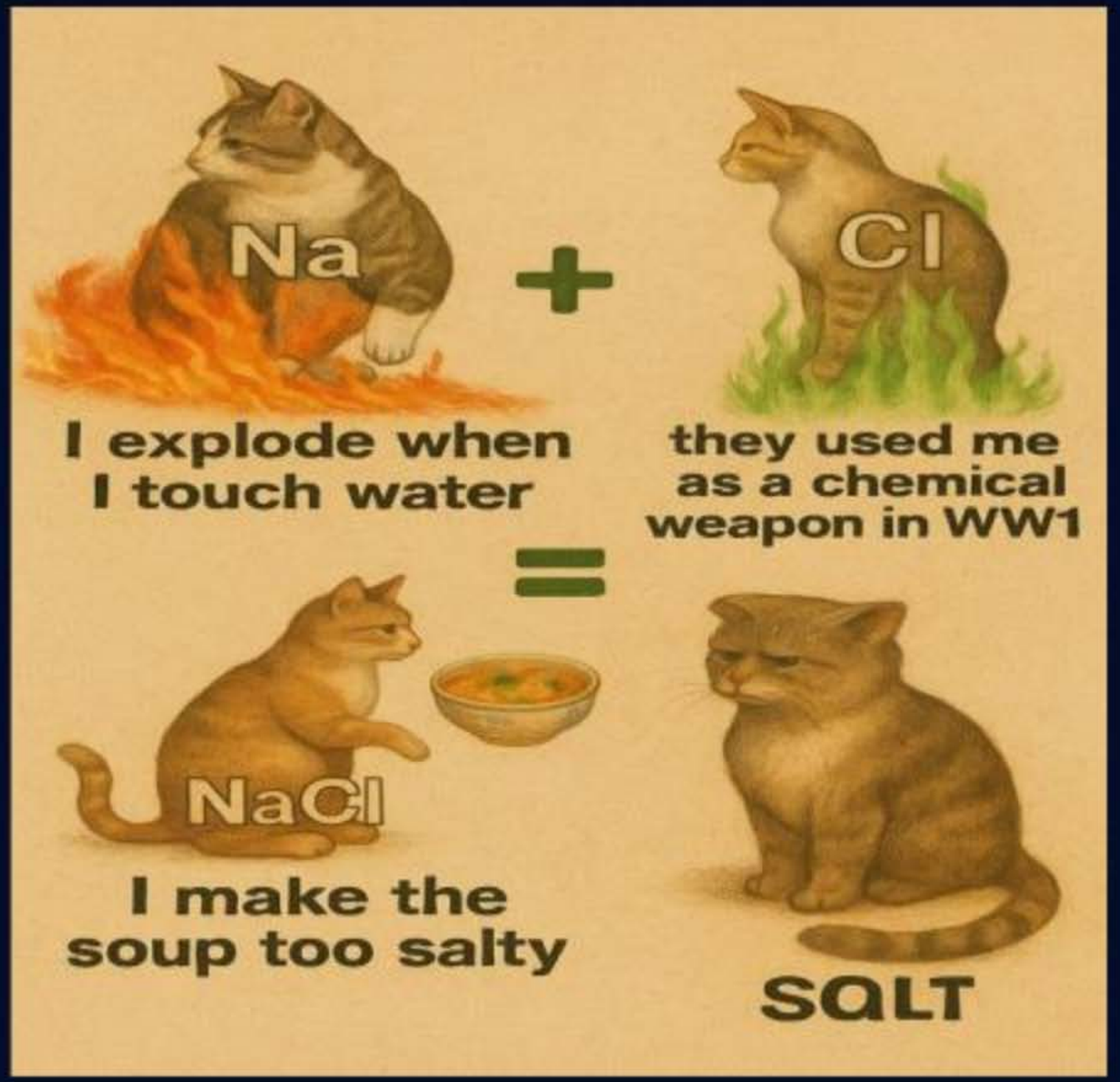
for ex :- $CO_2(g)$

① different elements Combine Chemically in fixed ratio

② Prop. Compd. diff. from elements

$$\underline{Na(s)} + \underline{Cl_2(g)} \longrightarrow \underbrace{2\,NaCl}_{\text{Salt}}$$

③ Cannot be separated by physical methods.



Question

Which of the following is a pure substance?

A ✗ Brass → Alloy → mixture of metals.

B ✗ Milk → Colloidal sol → Fat + water

C ✓ Distilled water
↳ water free from any minerals

D Air → mixture of gases

Question

Which of the following is a compound?

A Hydrogen gas $H_2(g)$

B Oxygen gas $O_2(g)$

C Carbon dioxide $CO_2(g)$

D Nitrogen gas $N_2(g)$

Question

Which of the following statements is true for compounds?

A. They can be separated by physical methods ✗

B. They are formed by physical mixing of elements ✗

C. They have variable composition ✗ $C + O_2 \rightarrow CO_2$

D. They are composed of elements in fixed ratio ✓

Question

Which of the following is a correct match?

A ✗ Air - Element

B ✗ Salt solution - Compound

$NaCl(s) + H_2O(l) \rightarrow$ Mixture

C ✓ Graphite - Element

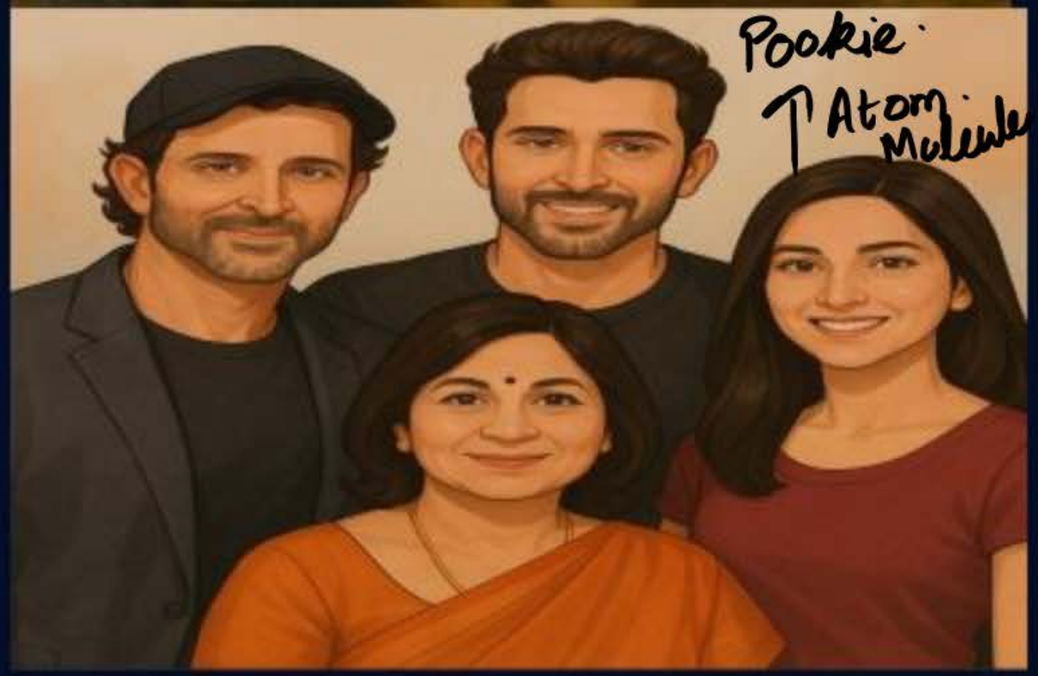
C (graphite)

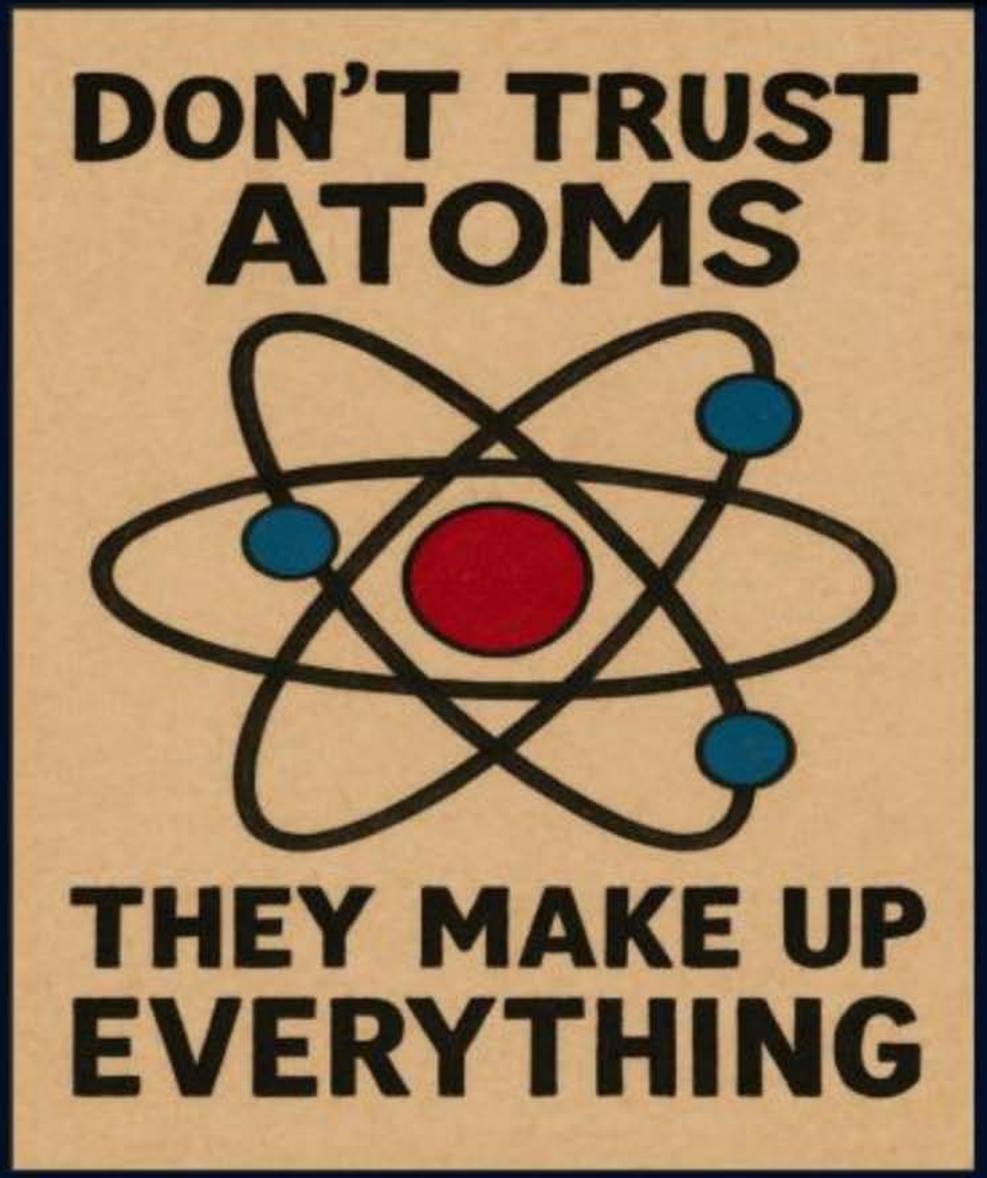
D ✗ Ammonia - Mixture

NH_3

Atom

Smallest particle of element.
may or may not have
independent existance.

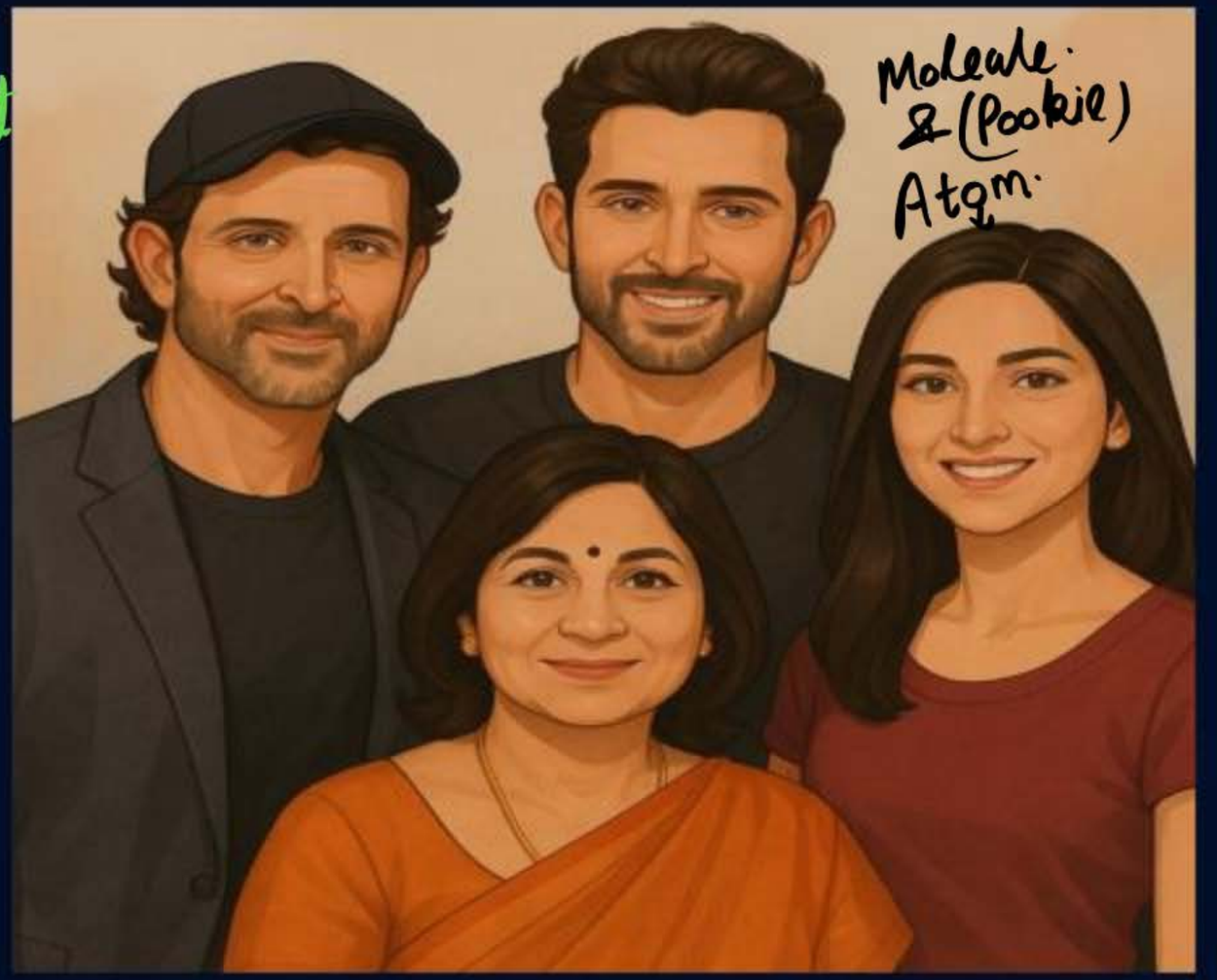



DON'T TRUST
ATOMS
THEY MAKE UP
EVERYTHING

Element	Symbol	Has independent existence	Does not have independent existence
Hydrogen	H	X	✓ H_2
Helium	He	✓ He	X
Sulphur	S	X	✓ S_8
Phosphorous	P	X	✓ P_4
Nitrogen	N	X	✓ N_2
Oxygen	O	X	✓ O_2
Chlorine	Cl	X	✓ Cl_2

Molecules

Smallest particle of element or Compound must have independent Existance.



Atomicity ⇒ no. of atoms in molecule.

1 molecule → 1 atom → monoatomic
→ 2 atoms → diatomic
→ 3 atoms → tri atomic

	Atom	Molecule
Hydrogen	H	H_2 → 1 molecule has 2 atoms
Chlorine	Cl	Cl_2 → 1 molecule has 2 atoms
Helium	He	He → 1 molecule has 1 atoms
Oxygen	O	O_2 → 1 molecule has 2 atoms
Sulphur	S	S_8 → 1 molecule has 8 atoms
Phosphorous	P	P_4 → 1 molecule has 4 atoms
Nitrogen	N	N_2 → 1 molecule has 2 atoms

Compound	Molecule	Atom	Total Atom in a molecule
Carbon monoxide	CO	1 atom of carbon 1 atom of Oxygen	1 + 1 = 2
Hydrazine	N_2H_4	2 atom of nitrogen 4 atom of hydrogen	2 + 4 = 6
Fructose	$C_6H_{12}O_6$	6 atom of carbon 12 atom of hydrogen 6 atom of oxygen	6 + 12 + 6 = 24

Symbol of An Element

#MIT

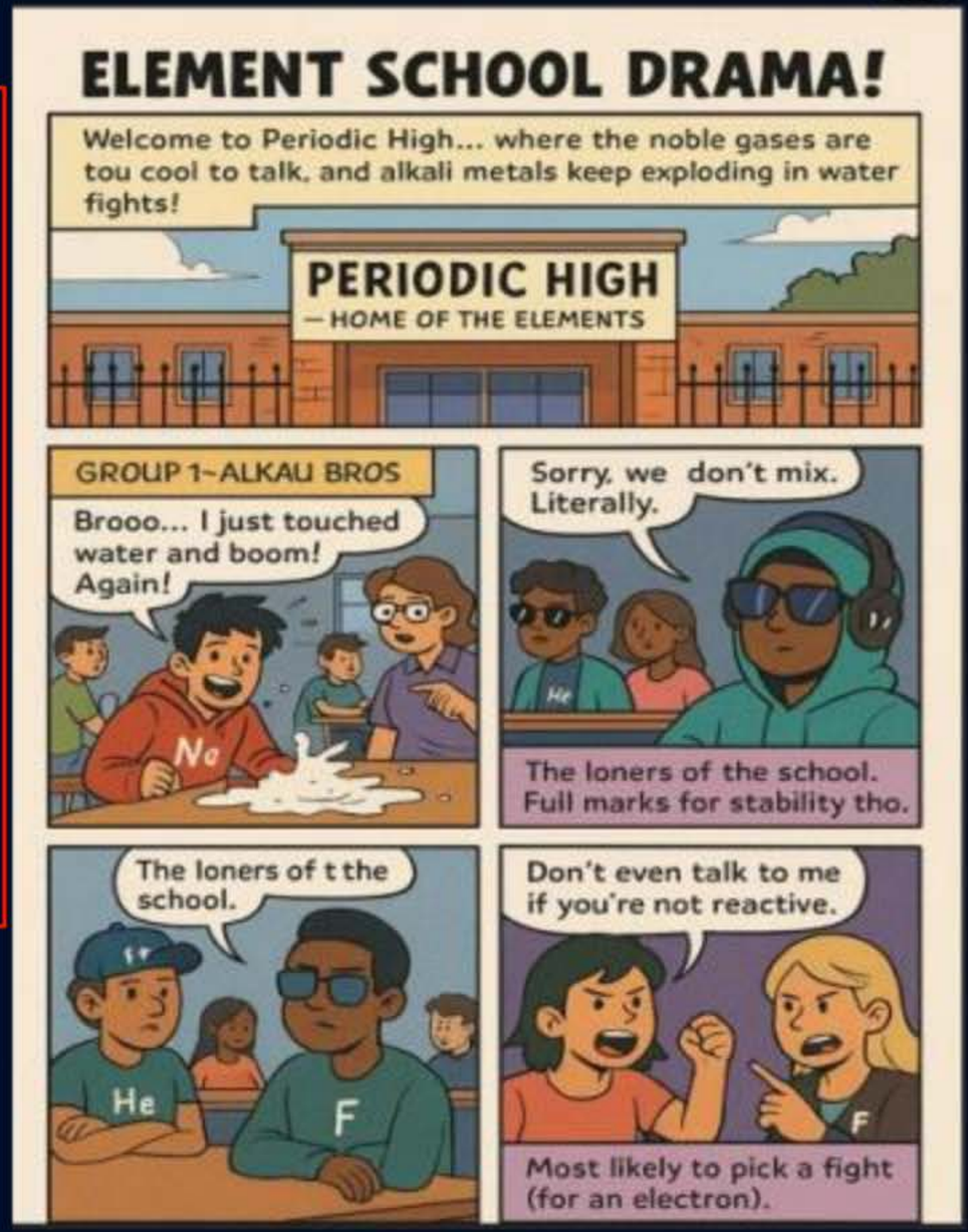
(A) → mass no. = (Z) protons + neutrons (n)

(Z) → 1 atom ⇒ n = A − Z

(Z) → 1 atom

(Z) Atomic no. = protons

(p) protons = electrons (e^-)



Question

$^{16}_{08}O$

Find atomic no. and mass no. of Oxygen ?

$Z = 8$

$A = 16$

$p = 8$

$e = 8$

$n = A - Z = 16 - 8 = 8$

		p	e^-	n
36	P	15	15	36 - 15 = 21
15				
32	S	16	16	32 - 16 = 16
16				
14	N	7	7	14 - 7 = 7
7				
19	F	9	9	19 - 9 = 10
9				

Question

Find no. of electron proton and Neutron in.

	No. of proton	No. of electron	No. of neutron
A $^{7}_{3}Li$	3	3	$7-3=4$
B $^{23}_{11}Na$	11	11	$23-11=12$
C $^{65}_{30}Zn$	30	30	$65-30=35$

Question

Which of the following may contain one proton and one neutron?

		p	n
A	${}_2^4He$	2	
B	${}_1^2D$	1	2-1=1
C	${}_1^3T$	1	3-1=2
D	H_2^+		

Symbol of a Molecule & subatomic particles in it

#MIT

$E_x G_y$

$p = \sum$ (no. of atoms $\times Z$) → add

$e^- = p$

$n = \sum (A - Z) \times$ no. of atoms → add

CO_2

$x = 1$

$y = 2$

N_2H_4 $\quad {}^{14}N \quad {}^{1}H$

$7 \quad 1$

$p = 2 \times 7 + 4 \times 1 = 18$

$e^- = 18$

$n = (14-7) \times 2 + (1-1) \times 4$

$= 14 + 0 = 14$

Question

Find no. of protons, Electron in neutrons in 1 molecule of NH_3 $^{14}_{7}N$, $^{1}_{1}H$

1 molecule of NH_3

$p = 1 \times 7 + 3 \times 1 = 10$

$e^- = 10$

$n = (14-7) \times 1 + (1-1) \times 3 = 7$

Question

Find no. of protons , electrons and neutrons in molecule of

$^{12}_{6}C$, $^{16}_{8}O$, $^{1}_{1}H$, $^{40}_{20}Ca$, $^{32}_{16}S$

		p	e^-	n
A	CO	$1\times6+1\times8=14$	14	$(12-6)\times1+(16-8)\times1=14$
B	CH_4	$6+4=10$	10	6
C	$CaCO_3$	$20+6+24=50$	50	50
D	SO_2	32	32	32

Question

Co → Cobalt.

CO → Carbon monoxide.

Co stands for ____ while CO stands for ____.

A. The atoms of the element cobalt; the atoms of the compound carbon monoxide

B. The atoms of the element carbon monoxide

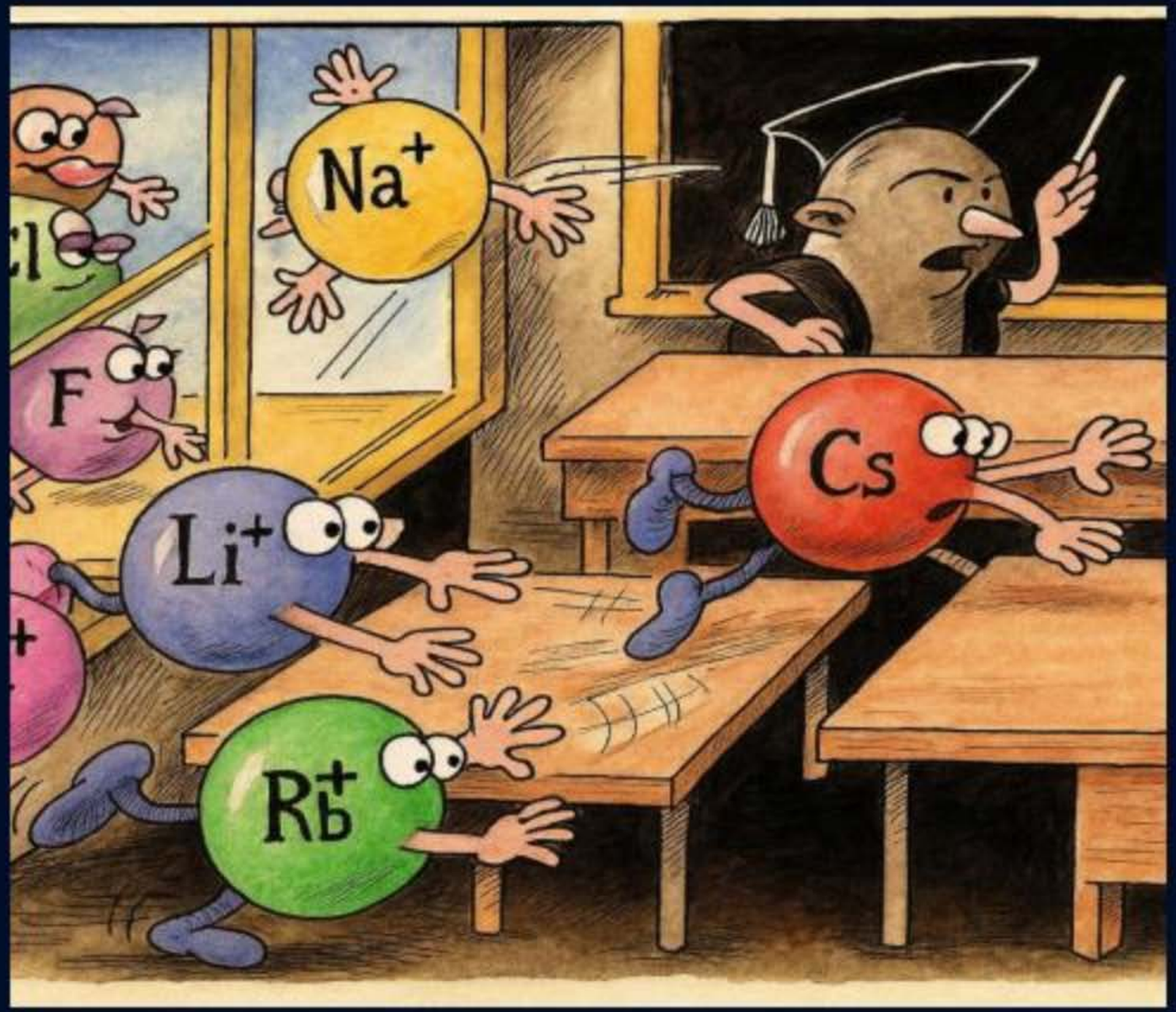
C. The atom of the element cobalt; the molecules of the compound carbon monoxide

D. The molecules and atoms of element carbon

Ions

Atom or molecule $\bar{e}$ exchange form ions.

- Cation
  - $\bar{e}$ loss
    - (+)ve ↑ or (-)ve ↓
- Anion
  - $\bar{e}$ gain
    - (-)ve ↑ or (+)ve ↓



e⁻ loss

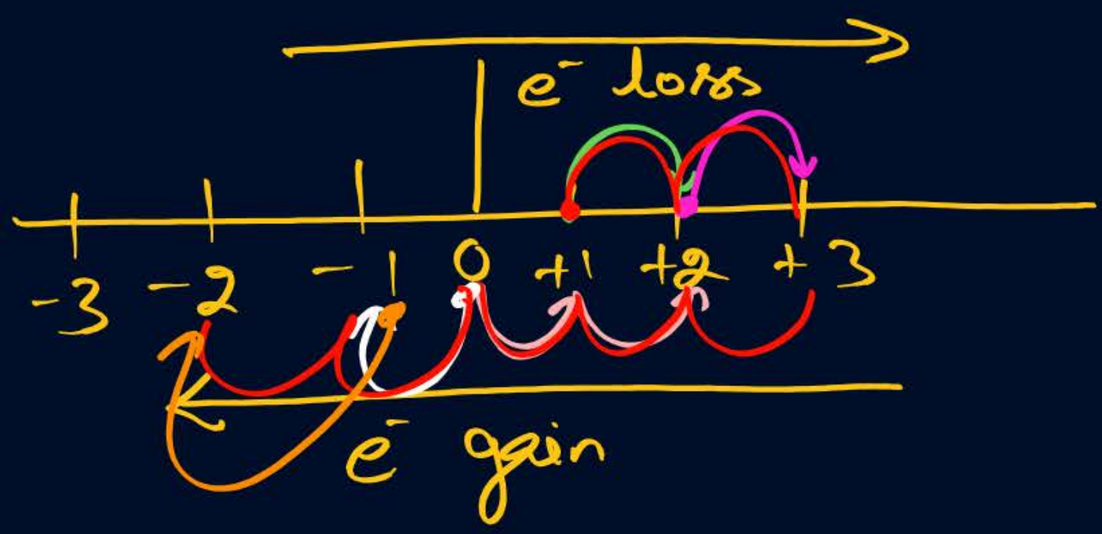
$Na \longrightarrow \overset{+1}{Na} + 1e^-$

$Mg \longrightarrow \overset{2+}{Mg} + 2e^-$

$Al \longrightarrow \overset{3+}{Al} + 3e^-$

$Ca^+ \longrightarrow \overset{2+}{Ca} + 1e^-$

$B^{2+} \longrightarrow \overset{3+}{B} + 1e^-$



$Al^+ \longrightarrow \overset{3+}{Al} + 2e^-$

$Cl + 1e^- \longrightarrow Cl^-$

$O + 2e^- \longrightarrow O^{2-}$

$N + 3e^- \longrightarrow N^{3-}$

$S^- + 1e^- \longrightarrow S^{2-}$

Number of protons, Electrons or Neutrons in an ion

(P) (e⁻) (n)

#MIT

p same way as molecule

n ,, ,, ,, ,,

$e^- = p - e^-\text{loss} + e^-\text{gain}$

Charge

Charge = e^- gained or e^- lost $\times \mp 1.6 \times 10^{-19}$ C

e^- gain.

SO_4^{2-} ✓ S^{32} ✓ O^{16}

S: 16 ✓ O: 8

$p = 16 \times 1 + 8 \times 4 = 48$

$n = (32-16) \times 1 + (16-8) \times 4 = 48$

$e^- = 48 + 2 = 50$

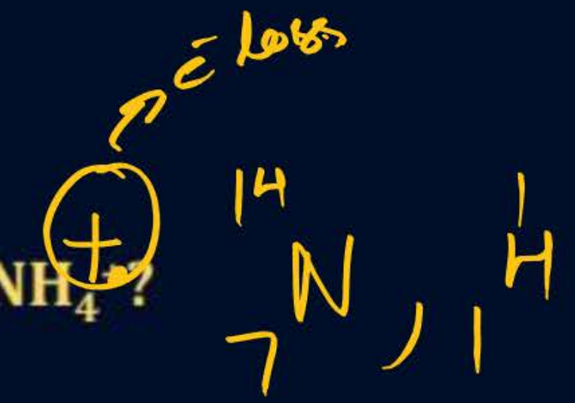
Charge $= 2 \times -1.6 \times 10^{-19}$ C

$= -3.2 \times 10^{-19}$ C

Question

Find the number of Protons, Electrons and Neutrons in NH_4^+?

& Charge.



$p = 7 \times 1 + 1 \times 4 = 11$

$n = (14-7) \times 1 + (1-1) \times 4 = 7$

$e^- = 11 - 1 = 10$

Charge $= 1 \times +1.6 \times 10^{-19}$ C

Question

Number of electrons in $^{40}_{19}K^{+}$

$e^- = 19 - 1 = 18$

A 31

B 40

C 18

D 17

Question

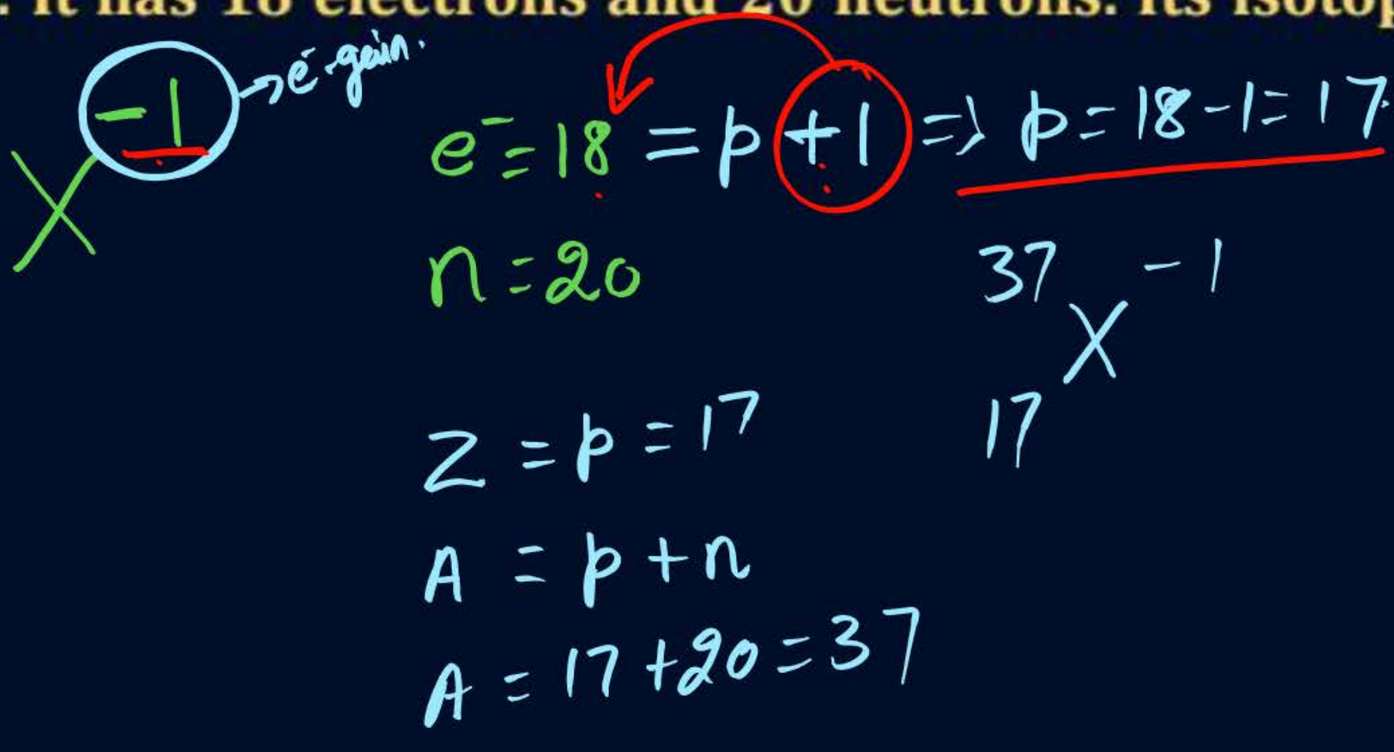
An atom has a net charge of –1. It has 18 electrons and 20 neutrons. Its isotopic symbol is:

A $^{37}_{18}Cl^-$

B $^{37}_{17}Cl^-$

C $^{37}_{16}Cl^-$

D $^{38}_{17}Cl^-$



Dalton's Atomic Theory

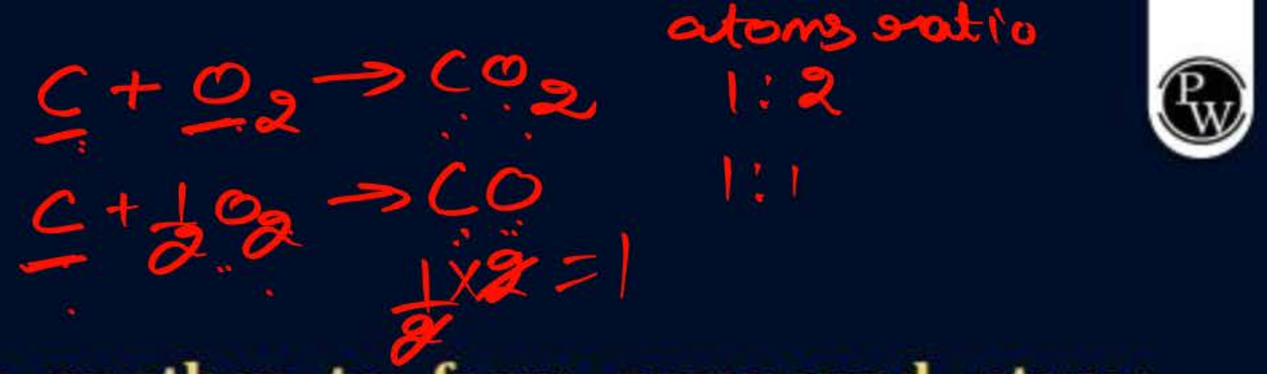
John Dalton in 1808 put forward a theory known as Dalton's atomic theory. The main points are:

1. Matter is made up of small indivisible particles called atoms.
2. Atoms of the same element are identical in all respects, i.e., size, shape and mass.
3. Atoms of different elements have different masses, sizes and also possess different chemical properties.
4. Atoms of the same or different element combine together to form compound atoms (now called as molecules)

$O + O \rightarrow O_2$

$C + O_2 \rightarrow CO_2$

Dalton's Atomic Theory

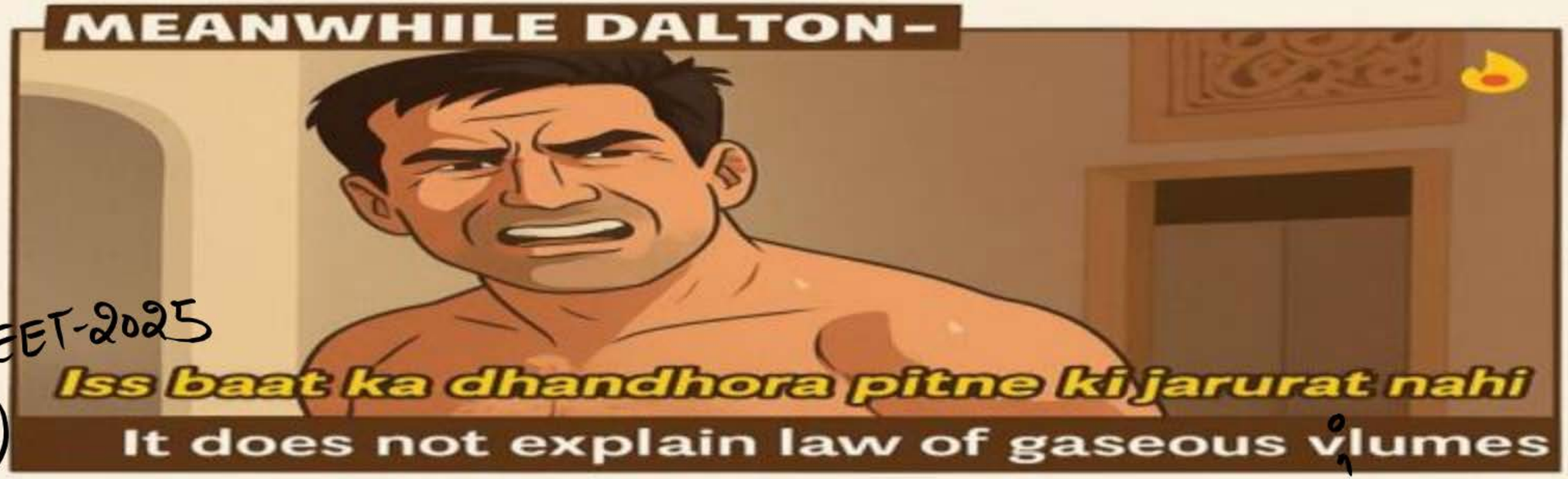


5. When atoms combine with one another to form compound atoms (molecules), they do so in simple whole number ratios, such as 1 : 1, 2 : 1, 2 : 3 etc.
6. Atoms of two elements may combine in different ratios to form more than one compound. For example, sulphur combines with oxygen to form sulphur dioxide and sulphur trioxide, the combining ratios being 1 : 2 and 1 : 3 respectively.
7. An atom is the smallest particles that takes part in a chemical reaction. In other words whole atoms, rather than fractions of atoms take part in a chemical reaction.
8. An atom can neither be created nor destroyed.

Limitation of Dalton's Atomic Theory

*DALTON'S ATOMIC THEORY

(1) Dalton's theory can't able to explain why do atoms combine & there is no mention of atomic weight of elements



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(2) It does not explain law of gaseous volumes

QUESTION (AIIMS 1994)

According to Dalton's atomic theory, the smallest particle in which matter can exist, is called.

A. An electron

B. An atom

C. A molecule

D. An ion

"Chemistry is the science of molecules and their transformations. It is the science not so much of the one hundred elements but of the infinite variety of molecules that may be built from them.

Roald Hoffmann

Question

Who defined chemistry as "the science of molecules and their transformations"?

A John Dalton

B Acharya Kanda

C Roald Hoffmann

D Nagarjuna

Mixtures

2 or more substances in any ratio.

Can be separated by physical methods or Chemical method.

2 Types

① Homogeneous mix.

② Heterogeneous mix.

Homogeneous Mixture

- They have uniform composition through out.

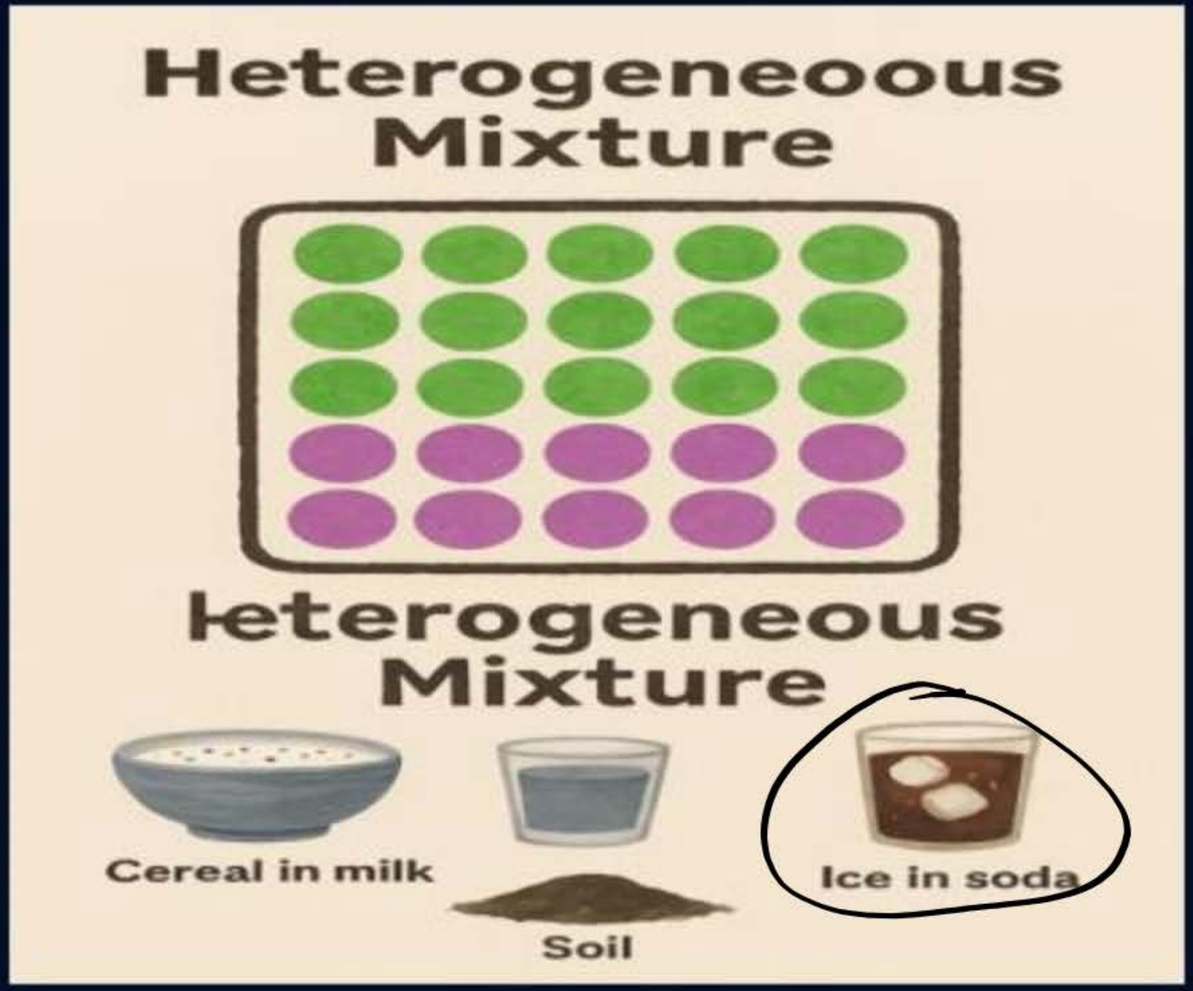
Ex. Salt + Water

Sugar + Water

Heterogeneous Mixture

- They do not having uniform composition through out.

For Ex:- Sand + Water
Rock + Water,
Muddy water



Question

An example of a homogeneous mixture is:

A Smoke

B Oil and water

C Sugar solution

D Soil

Question

Which of the following mixtures is heterogeneous?

A. Vinegar CH_3COOH + water

B. Brass

C. Blood

D. Alcohol and water

Question

Assertion: Air is always a homogeneous mixture.
Reason: Air is a mixture of gases like N_2, O_2 etc.

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

(B) Both A and R are correct and R is not the correct explanation of A.

(C) A is correct but R is incorrect

(D) A is incorrect but R is correct

Question

Which property best distinguishes a compound from a mixture?

A. Uniform appearance

B. Separation by physical means

C. Fixed ratio of components

D. Two or more substances present

Tricks for fast Calculations

$$\begin{array}{r} 23 \\ \times 56 \\ \hline \end{array}$$

$$\begin{array}{r} 231 \\ \times 565 \\ \hline \end{array}$$

$$\begin{array}{r} 962 \\ \times 873 \\ \hline \end{array}$$

$$\begin{array}{r} 945 \\ \times 233 \\ \hline \end{array}$$

$$\begin{array}{r} 62 \\ \times 89 \\ \hline \end{array}$$

$$\begin{array}{r} 326 \\ \times 629 \\ \hline \end{array}$$

$$\begin{array}{r} 728 \\ \times 124 \\ \hline \end{array}$$

$$\begin{array}{r} 429 \\ \times 135 \\ \hline \end{array}$$

$$\begin{array}{r} 922 \\ \times 188 \\ \hline \end{array}$$

$$\begin{array}{r} 333 \\ \times 456 \\ \hline \end{array}$$

Magarmach Practice Questions (MPQ)

Question

Which of the following statements about elements is incorrect?

A. All elements are made up of atoms

B. Elements can be broken down into simpler substances by chemical means

C. Elements may exist as atoms or molecules

D. Each element is represented by a unique symbol

Question

Which of the following statements about a compound is incorrect?

(NCERT Exemplar)

A. A molecule of a compound has atoms of different elements

B. A compound cannot be separated into its constituent elements by physical methods of separation

C. A compound retains the physical properties of its constituent elements

D. The ratio of atoms of different elements in a compound is fixed

Question

Assertion: The number of elements is limited but the number of compounds is unlimited.
Reason: Two or more elements combine to form a compound.

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

B. Both A and R are correct and R is not the correct explanation of A.

C. A is correct but R is incorrect

D. A is incorrect but R is correct

Question

According to ancient Indian texts, what is 'Paras'?

A. A golden dye

B. Philosopher’s stone

C. Elixir of life

D. An alchemy book

Question

When two or more elements combine chemically with one another ____ is formed?

A Element

B Mixture

C Fluid

D Compound

Question

The concept of indivisible particles or atoms in India was proposed by:

A. Nagarjuna

B. Acharya Kanda

C. Varāhamihira

D. Rasayana Rishi

Question

Which of the following represents a compound?

A O_2

B H_2

C NaCl

D He

Question

Which of the following is an element?

A Water

B Carbon

C Ammonia

D Glucose

Question

Which of the following is not a characteristic of mixtures?

A. Components retain their individual properties

B. Can be separated by physical methods

C. Have a fixed boiling point

D. May show variable composition

Question

Which property is common to both elements and compounds?

A Can be separated by physical means

B Represented by a chemical formula

C Composed of two or more substances

D Can exist as homogeneous or heterogeneous mixtures

Question

Which of the following is not a pure substance?

A Oxygen

B Water

C Milk

D Sodium chloride

Question

Assertion: The properties of a compound are same as those of its constituents.
Reason: A compound is always made up of the same elements combined together in a fixed ratio by mass.

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

(B) Both A and R are correct and R is not the correct explanation of A.

(C) A is correct but R is incorrect

(D) A is incorrect but R is correct

Question

Assertion: Solids have definite volume and shape.

Reason: In solids, the constituent particles are very close to each other and there is not much freedom of movement.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true and reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Question

Which one of the following pairs have both are present a compound and mixture

A NH_3 and salt solution

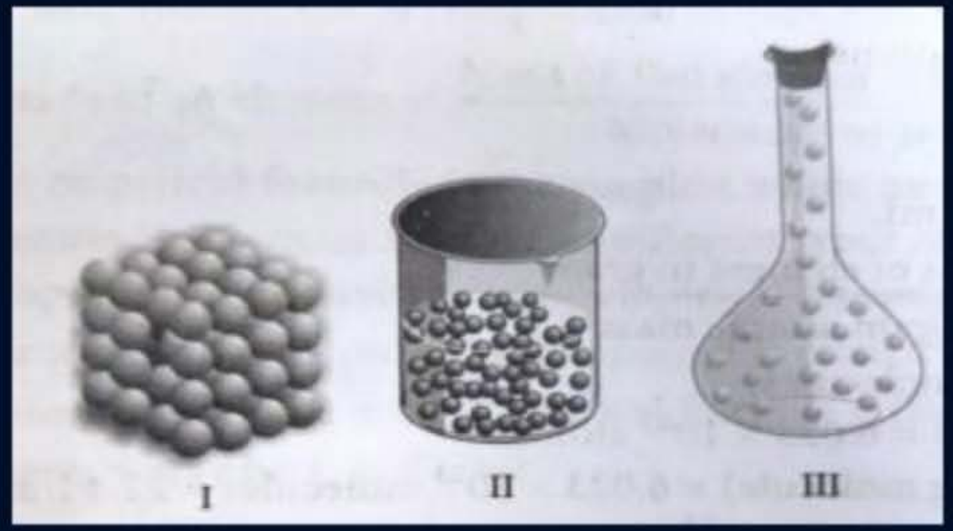
B Lemon juice and Liquid gum

C Ice cream and NaCl

D Gun powder and plaster of paris.

Question

Choose the correct statement about I, II and III.



A. I and II have definite volume but III does not have this property

B. I, II and III are interconvertible by changing the conditions of temperature and pressure

C. In the particles of I, freedom of movement is large

D. Both (A) and (B)

Question

Which one of the following statements is correct?

A. Two or more than two atoms of the elements combine and form compound.

B. The atoms retain their own property when form a compound.

C. Each substance of a mixture loses its original property.

D. Each substance of a mixture can be separated by physical or chemical methods.

Question

If mass of one atom is 3.32×10^{-23} g, then calculate number of nucleons (neutrons and protons) present in 2 atoms of the element:

A 40

B 20

C 10

D $40\ N_A$

Question

Assertion: Brass is a homogeneous mixture.
Reason: Brass is an alloy of copper and zinc.

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

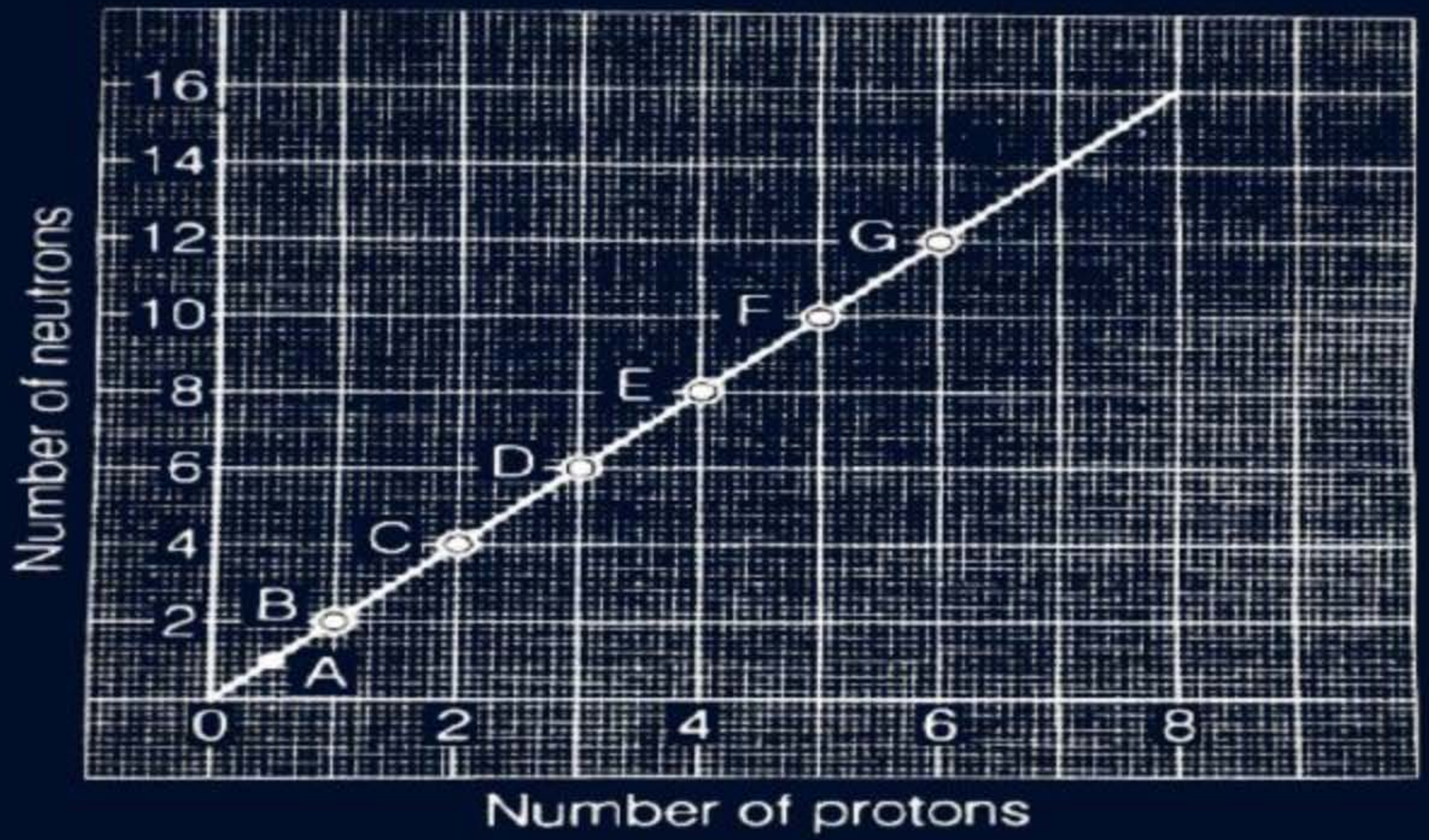
B. Both A and R are correct and R is not the correct explanation of A.

C. A is correct but R is incorrect

D. A is incorrect but R is correct

Question

In the graph, number of protons are plotted vs number of neutrons for the element A and G and H (hydrogen). Maximum number of neutrons are present in one formula unit of:



(A) DH_4E

(B) A_2E

(C) GE

(D) DE_2

Question

Classify each of the following as an element, a compound or a mixture.

(a) Water (b) iron (c) ice-cream (d) sugar
(e) toothpaste (f) silicon dioxide (g) sulfur (h) cement
(i) Air (j) magnesium oxide

Revision

Syllabus ahead ↑

pinned comment

Next Tuesday.

Morning 6 a.m.

THANK YOU

last class message.

link → Join 6 a.m. to 7 a.m. → Revise or Backlog.