

PERIODIC TABLE



PALLABI K. BORTHAKUR

Periodic Table of the Elements

Periodic Table of the Elements																		18					
1																	2						
1 H Hydrogen 1.0079	2 He Helium 4.0026																						
3 Li Lithium 6.941	4 Be Beryllium 9.01218															5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.0074	8 O Oxygen 15.9994	9 F Fluorine 18.998463	10 Ne Neon 20.1797		
11 Na Sodium 22.989768	12 Mg Magnesium 24.305	3 Al Aluminum 26.981538	4 Si Silicon 28.0855	5 P Phosphorus 30.973762	6 S Sulfur 32.06	7 Cl Chlorine 35.4527	8 Ar Argon 39.948											13 Ga Gallium 69.723	14 Ge Germanium 72.64	15 As Arsenic 74.92159	16 Se Selenium 78.96	17 Br Bromine 79.904	18 Kr Krypton 83.80
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.95591	22 Ti Titanium 47.88	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.9332	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.92159	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80						
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium 98.9072	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.9055	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.90447	54 Xe Xenon 131.29						
55 Cs Cesium 132.90543	56 Ba Barium 137.327	57-71 Lanthanide Series	72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.9665	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98037	84 Po Polonium [209]	85 At Astatine 209.9871	86 Rn Radon 222.0176						
87 Fr Francium 223.0197	88 Ra Radium 226.0254	89-103 Actinide Series	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [285]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [288]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Uuq Ununquadium [289]	115 Uup Ununpentium unknown	116 Uuh Ununhexium [288]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown						
			57 La Lanthanum 138.9055	58 Ce Cerium 140.115	59 Pr Praseodymium 140.90765	60 Nd Neodymium 144.24	61 Pm Promethium 144.9127	62 Sm Samarium 150.36	63 Eu Europium 151.9655	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92534	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93032	68 Er Erbium 167.26	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967						
			89 Ac Actinium 227.0278	90 Th Thorium 232.0381	91 Pa Protactinium 231.03688	92 U Uranium 238.02891	93 Np Neptunium 237.04817	94 Pu Plutonium 244.0642	95 Am Americium 243.0614	96 Cm Curium 247.0763	97 Bk Berkelium 247.0763	98 Cf Californium 251.0796	99 Es Einsteinium [252]	100 Fm Fermium 257.0951	101 Md Mendelevium 258.1	102 No Nobelium 259.1088	103 Lr Lawrencium [262]						
			Alkali Metal	Alkaline Earth	Transition Metal	Basic Metal	Semimetals	Nonmetals	Halogens	Noble Gas	Lanthanides	Actinides											

valence electron configuration is ns^{1-2}

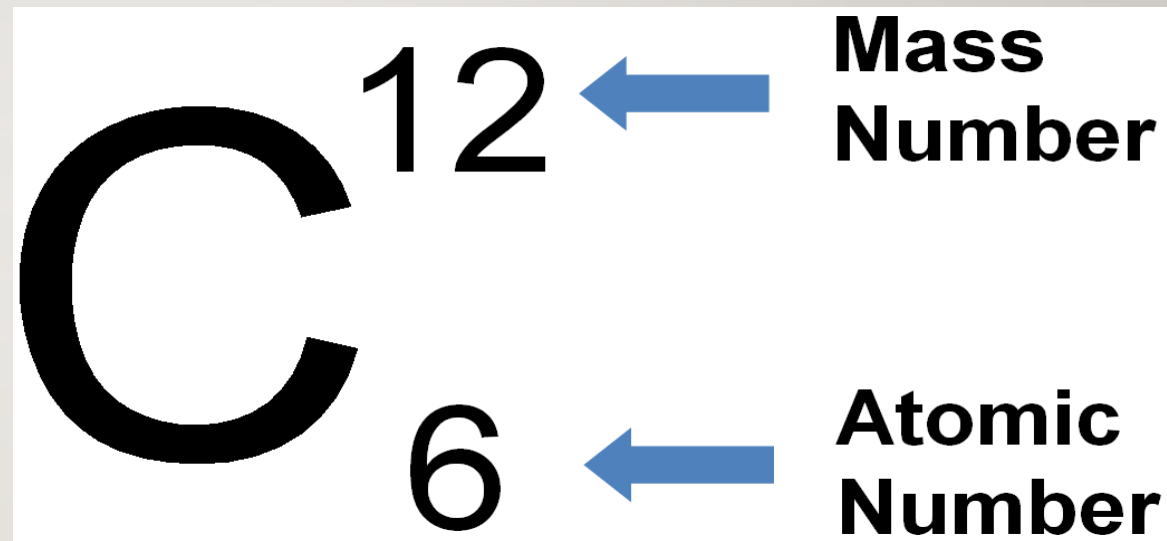
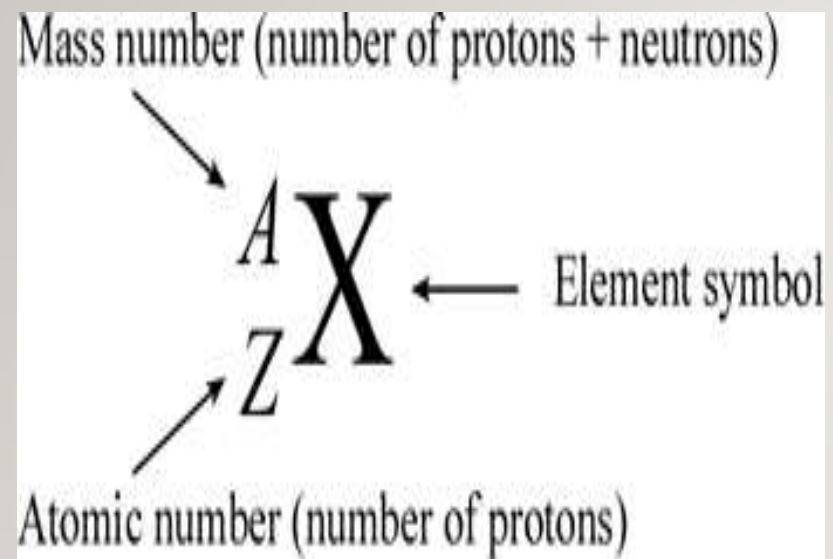
valence electron configuration is ns^{1-2}

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THE *P*-BLOCK ELEMENTS

<div>P-Block Elements</div>																											

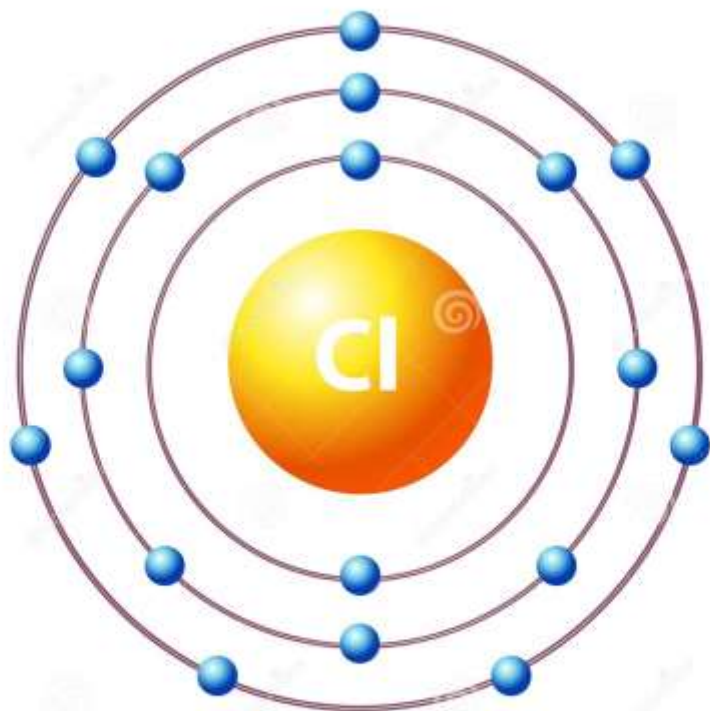




17

Chlorine

Cl



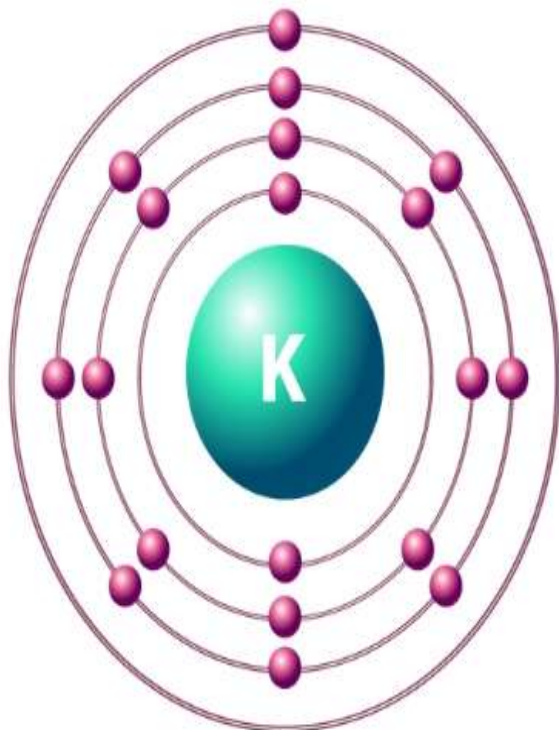
Atomic mass: 35.45

Electron configuration: 2, 8, 7

19

Potassium

K



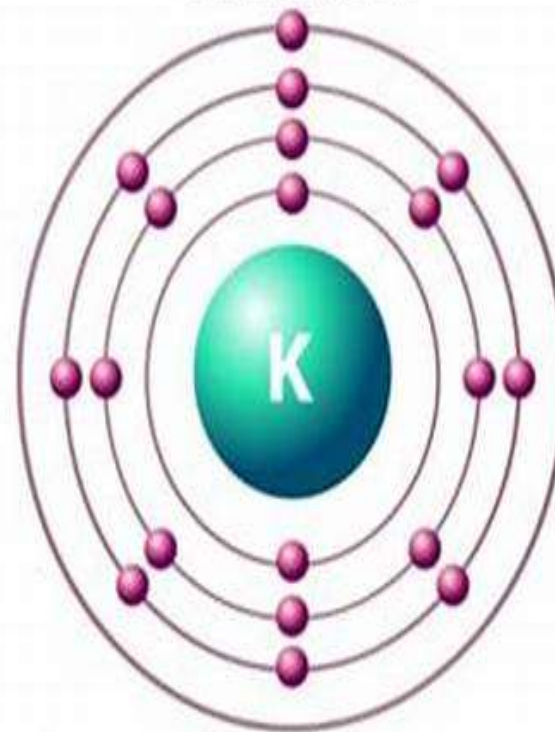
Atomic mass: 39.098

Electron configuration: 2, 8, 8, 1

20

Calcium

Ca

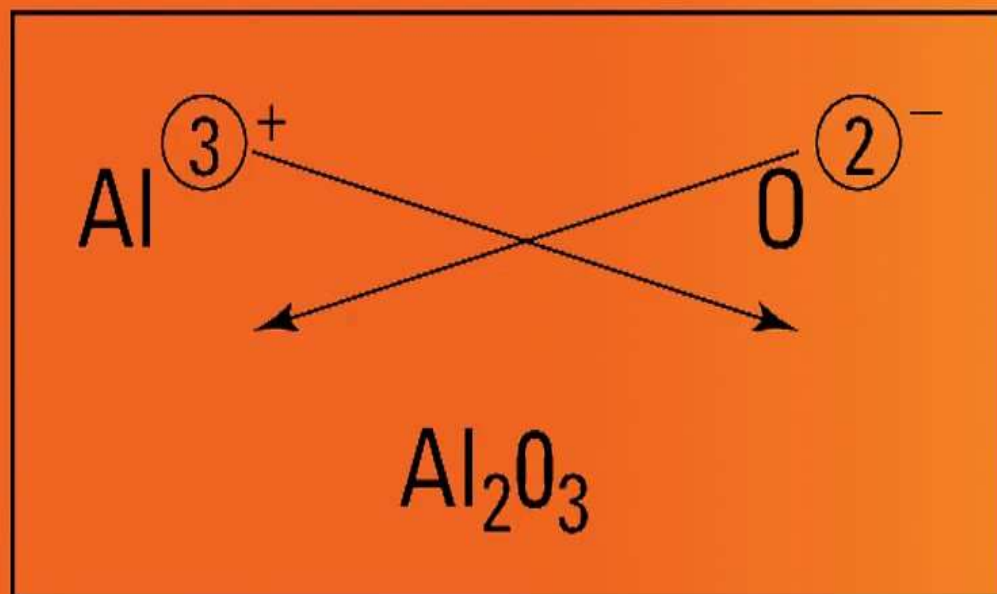


Atomic mass: 40.078

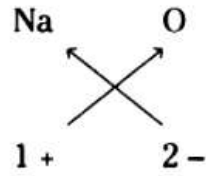
Electron configuration: 2, 8, 8, 2

WRITING CHEMICAL FORMULAE OF COMPOUND

CRISS-CROSS METHOD



i) Symbol / Formula

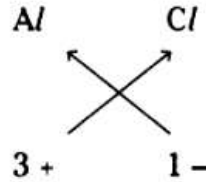


Charge

Formula : Na_2O

The formula of sodium oxide is Na_2O .

ii) Symbol / Formula

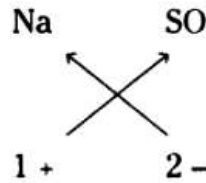


Charge

Formula : AlCl_3

The formula of aluminium chloride is AlCl_3 .

iii) Symbol / Formula

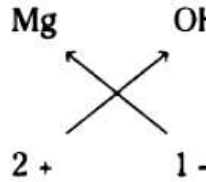


Charge

Formula : Na_2SO_4

The formula of sodium sulphate is Na_2SO_4 .

iv) Symbol / Formula



Charge

Formula : $\text{Mg}(\text{OH})_2$

1. Which of the following are matter?

Chair, air, love, smell, hate, almonds, thought, cold, lemon water, the smell of perfume.

Solution:

The following substances are matter:

Chair

Air

Almonds

Lemon water

The smell of perfume (Smell is considered as a matter due to the presence of some volatile substances in air that occupy space & have mass.)

2. Give reasons for the following observation:

The smell of hot sizzling food reaches you several meters away, but to get the smell from cold food, you have to go close.

Solution:

Particles in the air, if fueled with higher temperatures, acquire high kinetic energy, which aids them to move fast over a stretch. Hence, the smell of hot sizzling food reaches a person even at a distance of several meters.

3. A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?

Solution:

The diver is able to easily cut through the water in the swimming pool because of the weak forces of attraction between water molecules. It is this property of water that attributes to easy diving.



What are the characteristics of the particles of matter?

Solution:

The characteristics of particles of matter are as follows:

- (a) Presence of intermolecular spaces between particles
- (b) Particles are in constant motion
- (c) They attract each other
- (d) All matter is composed of very small particles which can exist independently.

Give reasons

- a) A gas fills completely the vessel in which it is kept.**
- b) A gas exerts pressure on the walls of the container.**
- c) A wooden table should be called a solid.**
- d) We can easily move our hand in the air, but to do the same through a solid block of wood, we need a karate expert.**



1. Convert the following temperature to Celsius scale:

a. 300K b. 573K

Solution:

a. $0^{\circ}\text{C} = 273\text{K}$

$$300\text{K} = (300 - 273)^{\circ}\text{C} = 27^{\circ}\text{C}$$

$$\text{b. } 573\text{K} = (573 - 273)^{\circ}\text{C} = 300^{\circ}\text{C}$$

2. What is the physical state of water at:

a. 250°C b. 100°C ?

Solution:

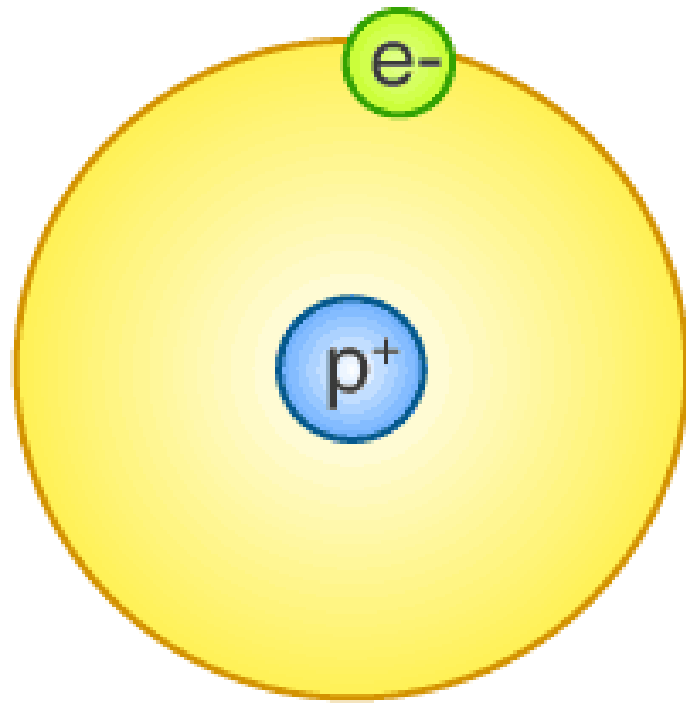
(a) At 250°C – Gaseous state since it is beyond its boiling point.

(b) At 100°C – It is at the transition state as the water is at its boiling point. Hence it would be present in both liquid and gaseous states.

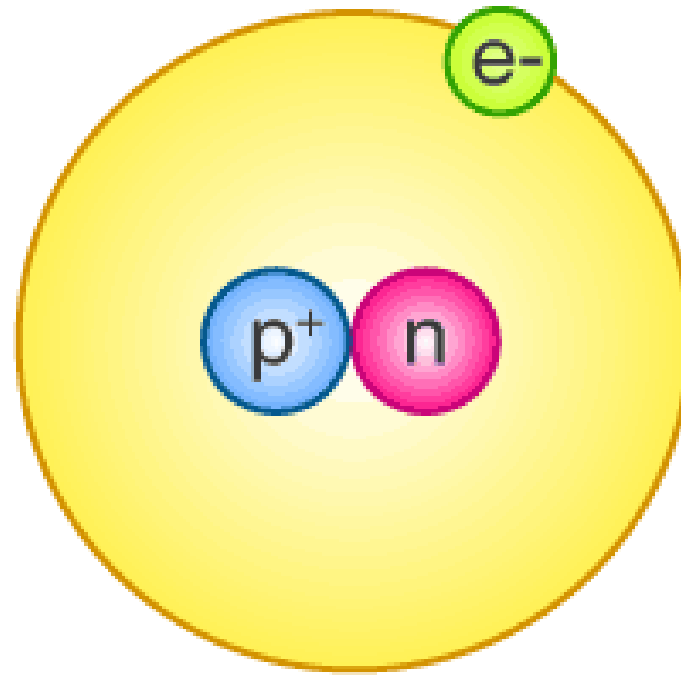


ELEMENTARY IDEA ABOUT THE STRUCTURE OF ATOM

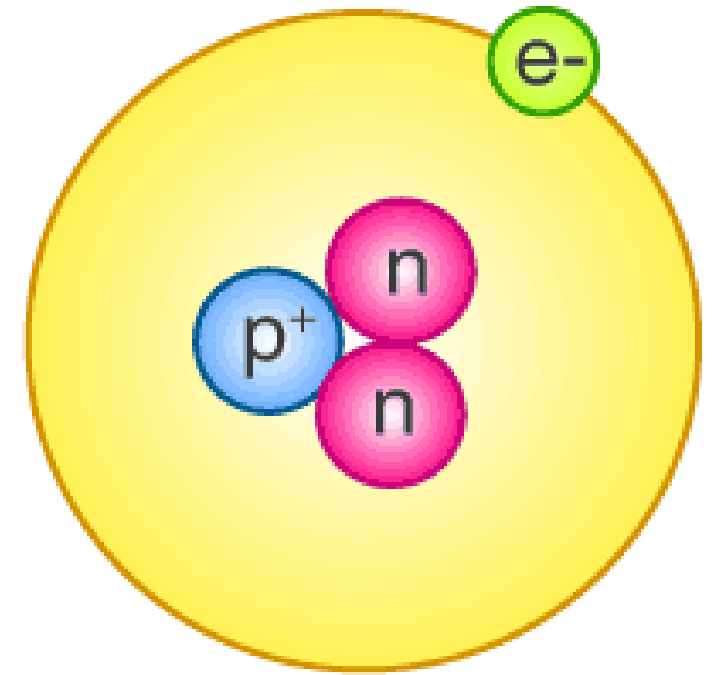
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Hydrogen-1
Mass number : 1



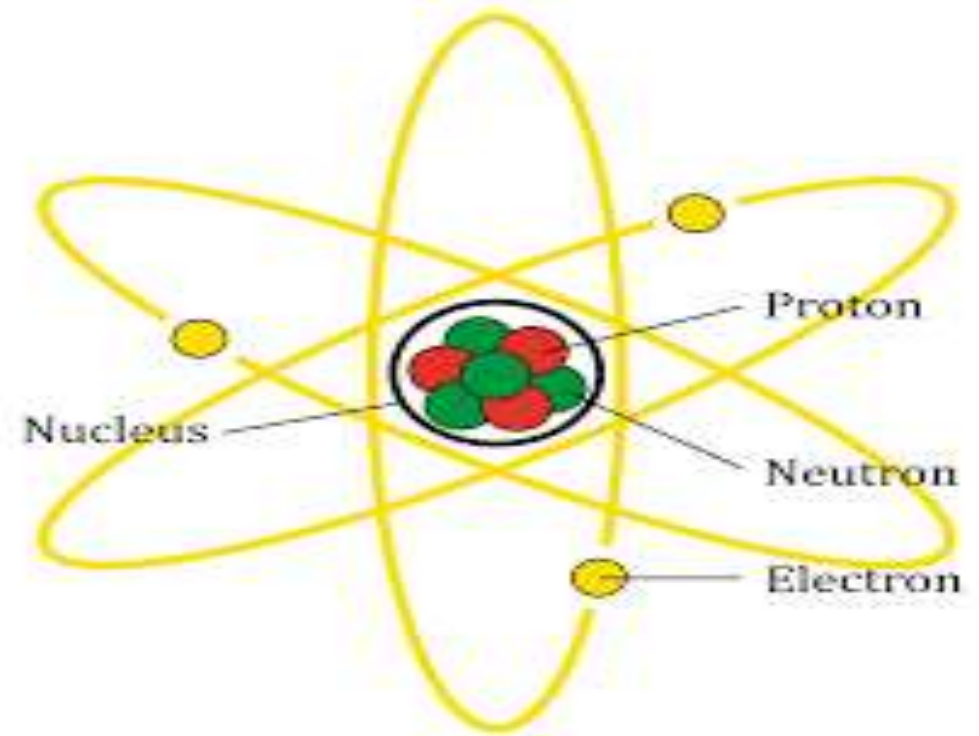
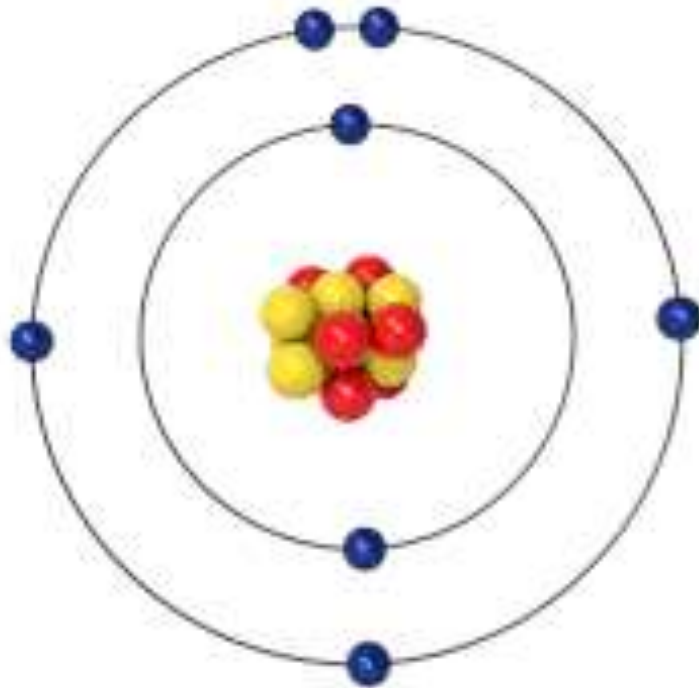
Hydrogen-2
Deuterium
Mass number : 2



Hydrogen-3
Tritium
Mass number : 3

The atomic structure refers to the structure of an atom comprising a nucleus (centre) in which the protons (positively charged) and neutrons (neutral) are present. The negatively charged particles called electrons revolve around the centre of the nucleus.

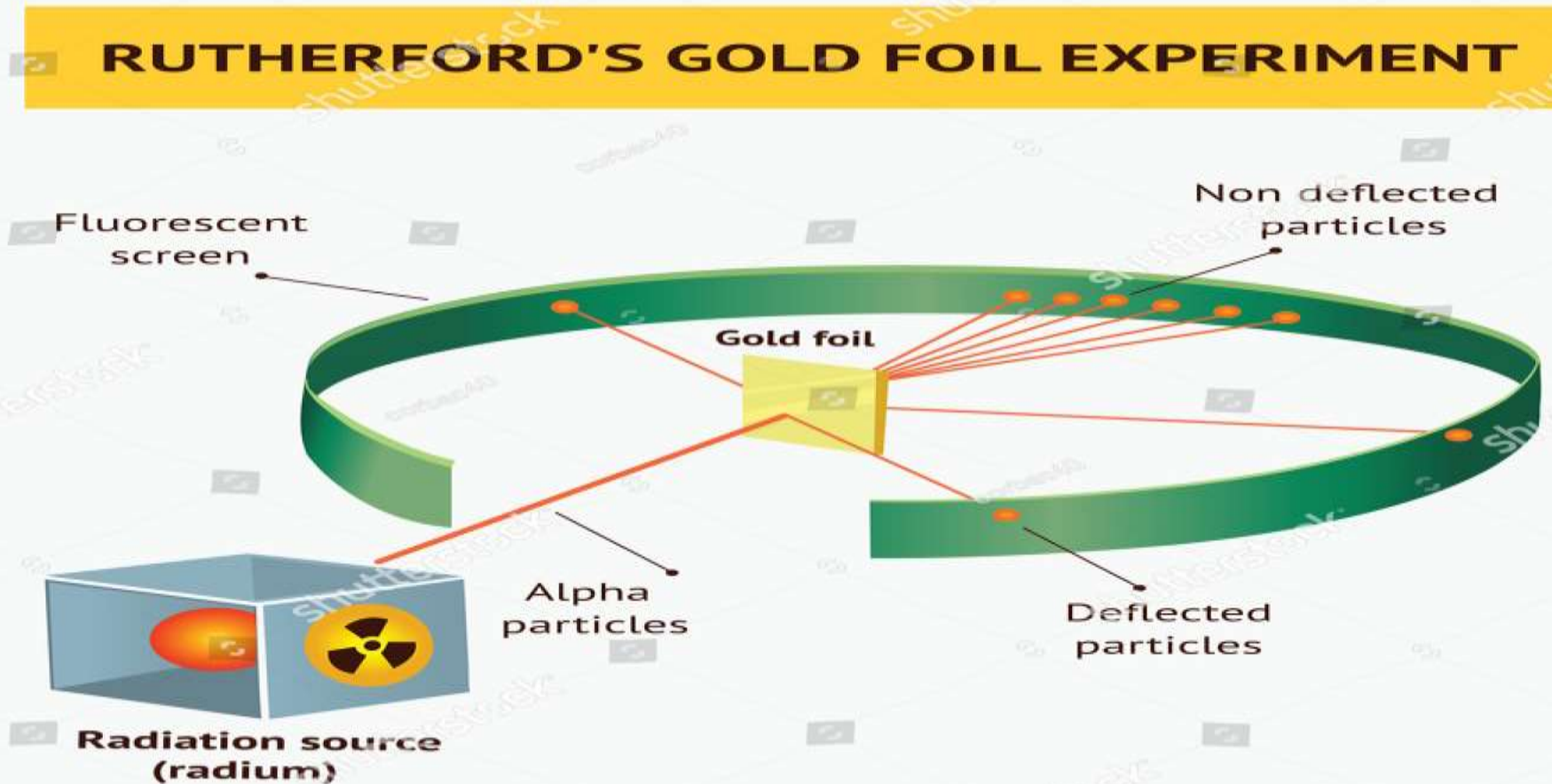
Discovery of Subatomic Particles



Rutherford Atomic Theory

Rutherford, a student of J. J. Thomson, modified the atomic structure with the discovery of another subatomic particle called "Nucleus". His atomic model is based on the Alpha ray scattering experiment.

Alpha Ray Scattering Experiment



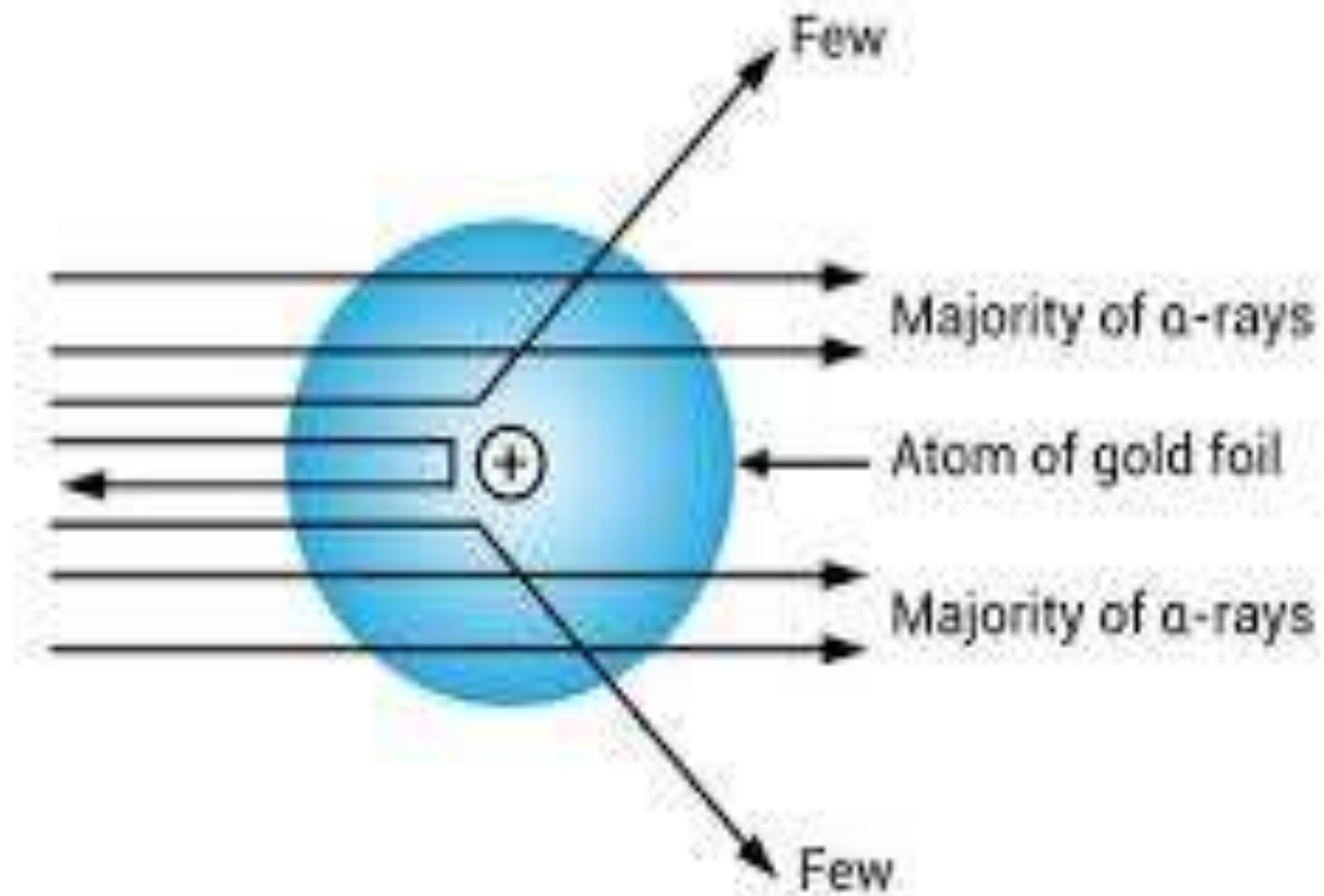


FIGURE 10-10

Q. Scattering of α -particles by a thin gold foil suggests the presence of

- a) Electron in an atom
- b) Positively charged nucleus at the centre of an atom
- c) Proton in an atom
- d) Isotopes of gold