Pakistan School
Kingdom of Bahrain


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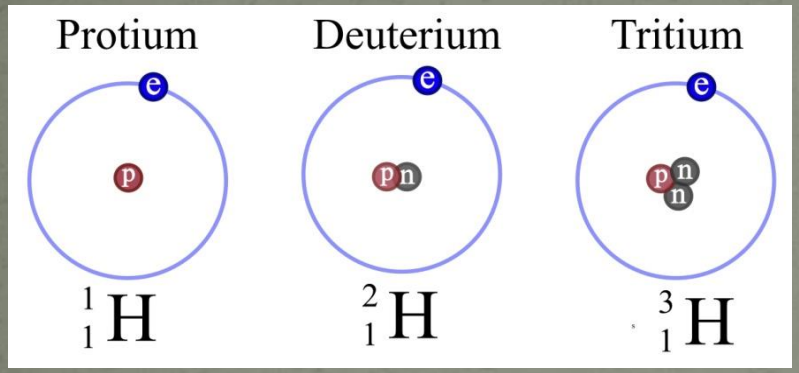
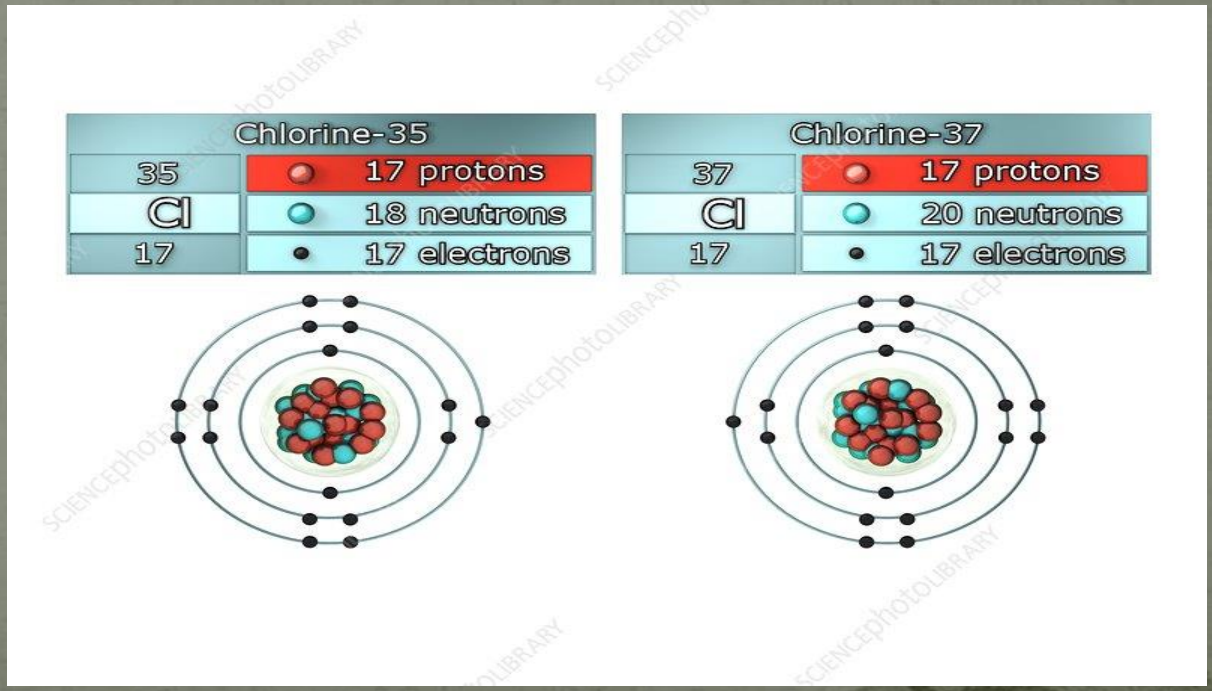
PAKISTAN SCHOOL
المدرسة الباكستانية

Class: 9th

Subject: Chemistry

Review:


Protium
Deuterium
Tritium
e
p
n
$^{1}_{1}H$
$^{2}_{1}H$
$^{3}_{1}H$


Chlorine-35
35
Cl
17
17 protons
18 neutrons
17 electrons
Chlorine-37
37
Cl
17
17 protons
20 neutrons
17 electrons

- Main Difference between heavy and ordinary water?
- Which isotope of carbon is radioactive?

Topic

Uses of Isotopes
And
Shells and sub shells

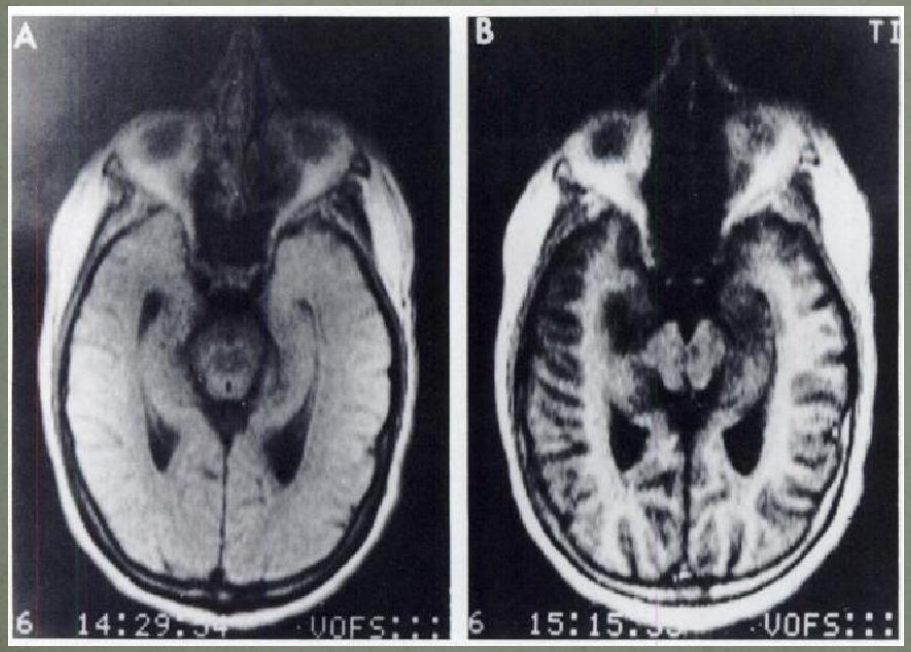
Objective

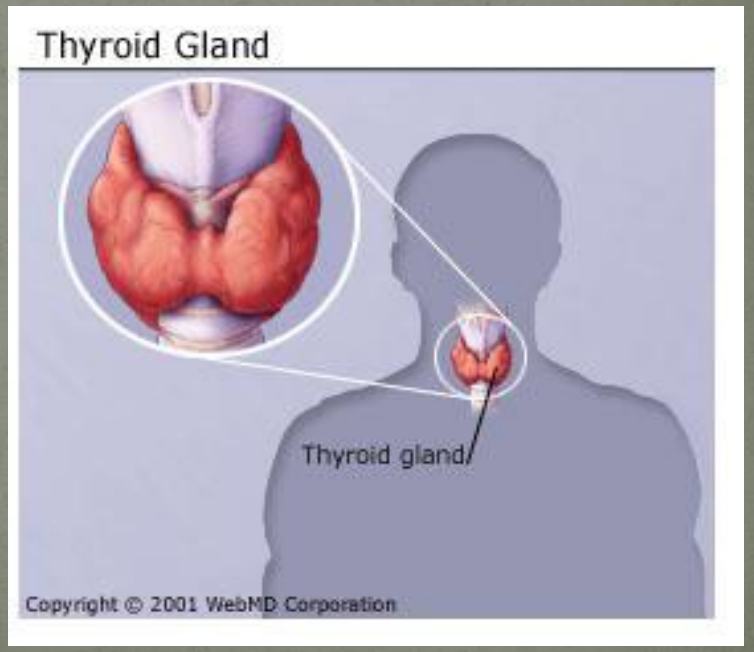
At the end of this lesson Students will be able to:

- State the importance and uses of isotopes in various field of life.
- Distinguish between shells and sub shells.

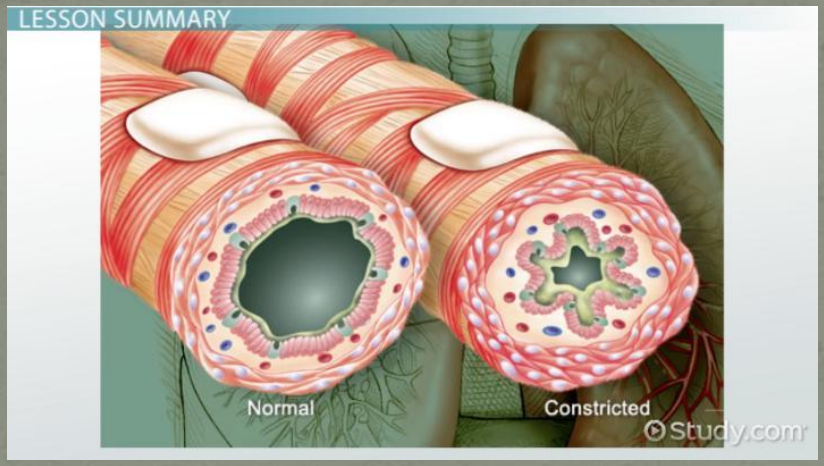
Uses of Isotopes

- **Iodine-123:** Is used to image the brain.
- **Iodine-131**: Used as a tracer in diagnosing thyroid problem.





- **Na-24:** is used to trace the flow of blood and detect possible constrictions or obstructions in circulatory system.



- **Calcium -47**: Important aid to biomedical researchers studying the cellular functions and bone formation in mammals.

- **Cobalt -60** is commonly used to irradiate cancer cell in the hope of killing or shrinking the tumors
- Carbon-14 is used to trace the path of carbon photosynthesis.
- Radioactive isotopes are also used to study the mechanism of chemical reactions.
- Radioactive isotopes are used to date rocks, soils, archaeological objects and mummies.

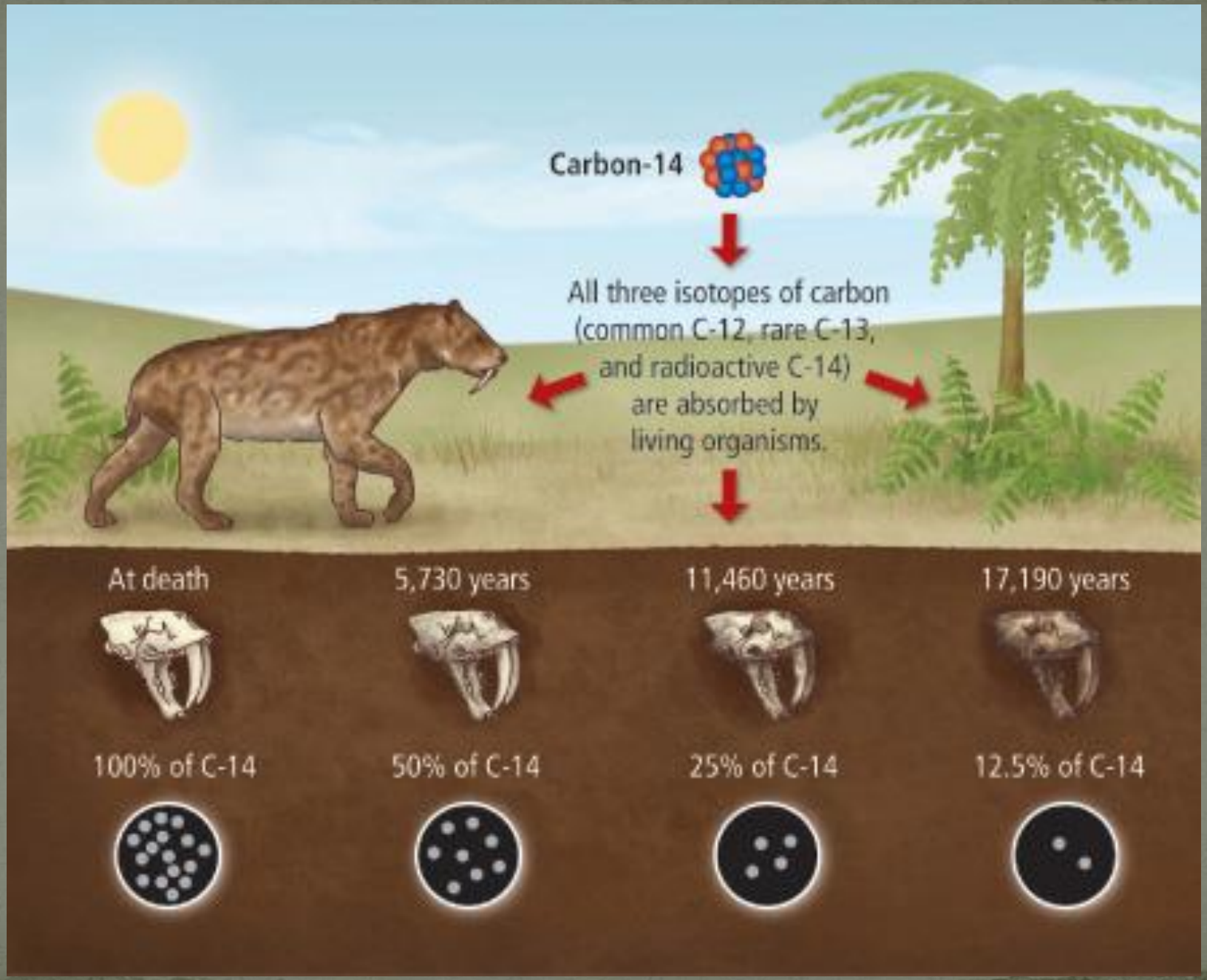
Radiocarbon dating

Is a method for determining the age of an object containing organic material by using the properties of **radiocarbon**, a radioactive isotope of **carbon**.

Carbon-14 is used to estimate the age of carbon-containing substances carbon atoms circulate between the oceans, and living organism at a rate very much faster than a decay.

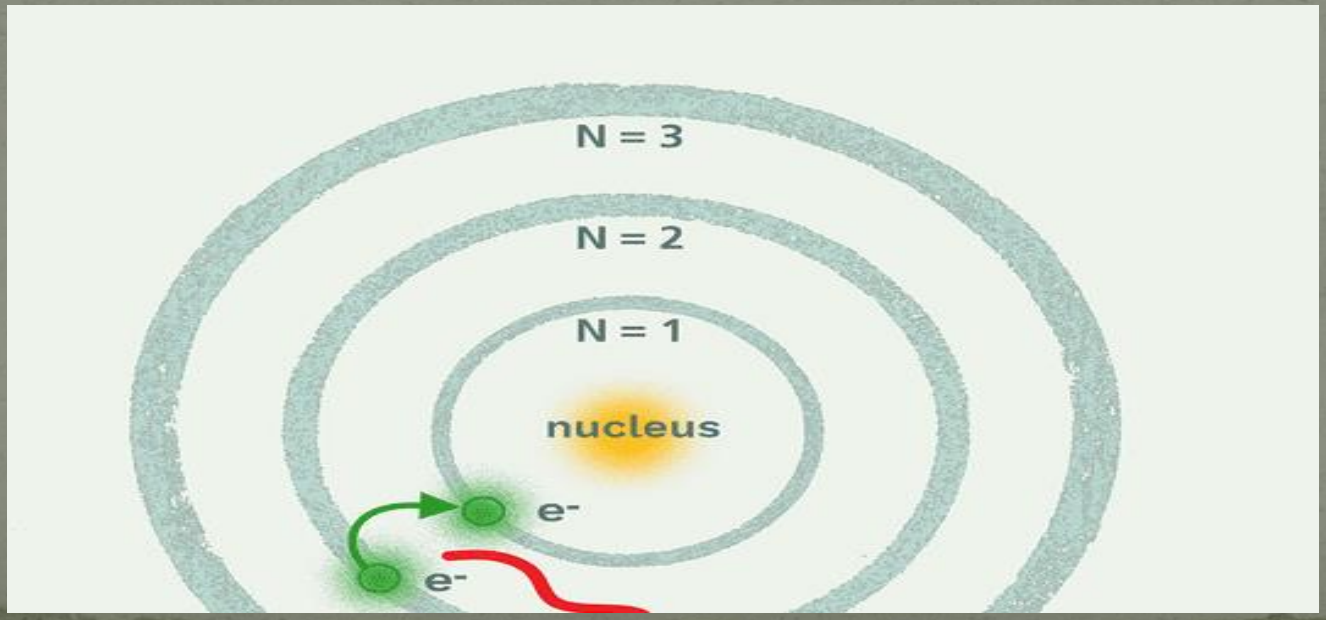
As a result the concentration of C-14 in all living things keep on increasing.

After death organisms no longer pick up c-14. By comparing the activity of a sample of skull or jaw bones, with the activity of living tissues, we can estimate how long it has been since the organism died.


Carbon-14
All three isotopes of carbon (common C-12, rare C-13, and radioactive C-14) are absorbed by living organisms.
At death
5,730 years
11,460 years
17,190 years
100% of C-14
50% of C-14
25% of C-14
12.5% of C-14

Shells:

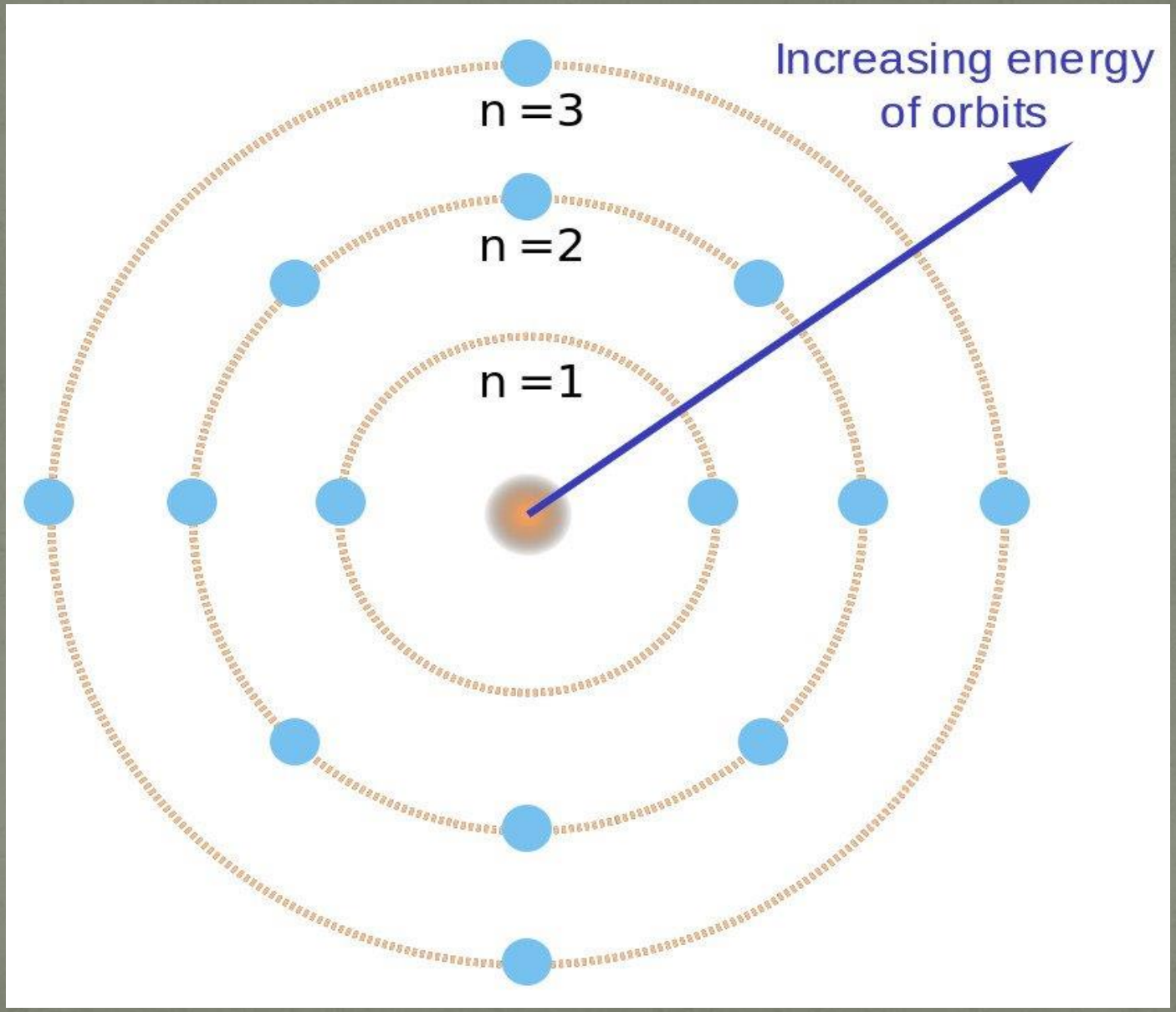
- According to the Bohr theory electrons in an atom revolve around nucleus in one of the circular paths called shells or orbits or energy levels.
- Each shell is described by an n value and n can have values 1, 2,3.....



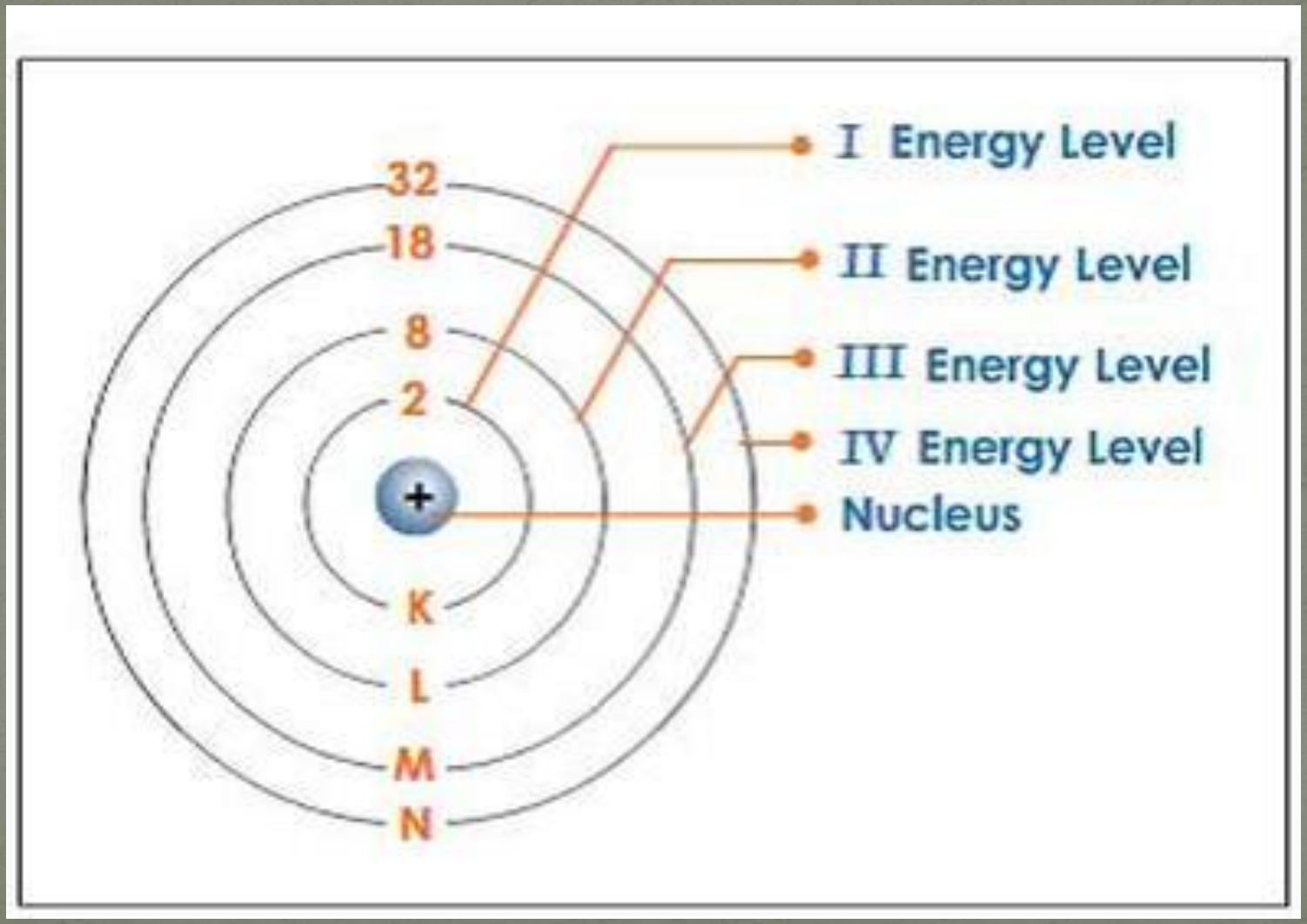
When

- n=1 it is K shell
- n=2 it is L shell
- n=3 it is M shell

As the value of n increases the distance of electron from the nucleus and energy of the shell increases.


Increasing energy
of orbits
n =3
n =2
n =1

Shells capacity:



Sub shell

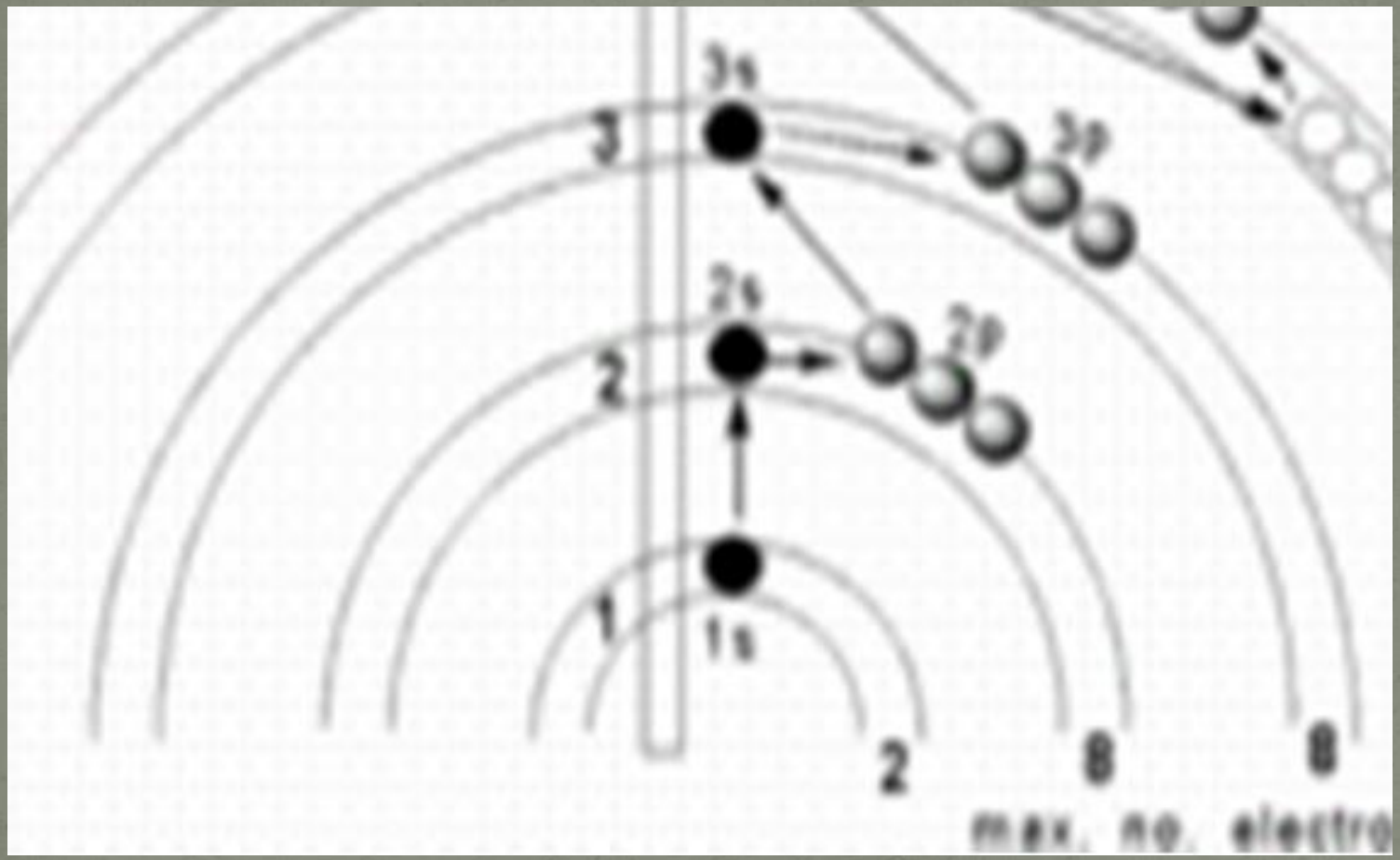
A shell or energy level is subdivided into sub-shells or sub energy levels. n value of shell is placed before the symbol of sub-shell.

- s
- p
- d
- f

For instance

- n=1 for K Shell and will be represented as 1s
- n=2 for L Shell and will be represented as 2s, 2p
- n=3 for M Shell and will be represented as 3s,3p,3d
- n=4 for N Shell and will be represented as 4s,4p,4d,4f

Sub Shells Arrangment:



- s sub shell can accommodate maximum 2 electrons.
- p sub shell can accommodate maximum 6 electrons.
- d sub shell can accommodate maximum 10 electrons.
- f sub shell can accommodate maximum 14 electrons.

- K
- L
- M
- N

Shell	Sub-shell						No
n	*s*	*p*	*d*	*f*	*g*	*h*	
1	1s=2						*2*
2	2s=2	2p=6					*8*
3	3s=2	3p=6	3d=10				*18*
4	4s=2	4p=6	4d=10	4f=14			*32*

Electronic Configuration:

The distribution of electrons in various sub-shells is called electronic configuration.

Plenary

- Carbon —— is used to trace the path of carbon photosynthesis.
- **Iodine-131**: Used as a tracer in diagnosing thyroid problem. (T/F)
- Define Shell?
- f sub shell can accommodate maximum —— electrons. (14/16/18)
- Carbon-12 is used to estimate the age of carbon-containing substances (T/F)

Home wrok

- Search and write some more Importance and uses of Isotopes in various field of life?
- How many Electrons can be placed in all of the sub shells in the n=2 shell?


STAY
home
STAY
safe

ALLAH HAFIZZ