Séries N° 2

Exercise 1:

1. Which pair represents isotopes, isotones, isobars or isoelectronic?

	I	J	K	L	M
Number of electrons	26	26		17	
Number of neutrons	30	28		18	
Number of protons			17		26
Mass number			37		56

How many protons, neutrons and electrons are in each of the following atoms or ions?

$^{55}_{25}Mn$ $^{40}_{18}Ar$ $^{96}_{42}Mo$ $^{48}_{22}Ti$ $^{207}_{82}Pb^{2+}$ $^{80}_{35}Br^{-}$ $^{122}_{51}Sb^{3+}$ $^{31}_{15}P^{3-}$.

Exercise 2:

The element europium exists in nature as two isotopes: $^{151}_{63}Eu$ has a mass of 150.9196 u and $^{153}_{63}Eu$ has a mass of 152.9209 u. The average atomic mass of europium is 151.96 u.

Calculate the relative abundance of the two europium isotopes.

Exercise 3:

1)- The radius of hydrogen atom is 0.53Å (r=0.53Å.). Assuming the hydrogen atom as spherical, calculate the volume of a hydrogen atom in m^3.

2)- Calculate the mass of hydrogen in K,grams.

3)- Calculate the density of hydrogen atom in $kg.m^{-3}$ and in $g.cm^{-3}$

4) -If we consider that the radius of the nucleus is about 100000 times less than the radius of the atom. What will be the radius of nucleus size?

5) Calculate the volume of a hydrogen nucleus and his density in $kg.m^{-3}$, in $g.cm^{-3}$ and in $tonne.cm^{-3}$.

Exercise 4:

When a deuterium nucleus $\mathbf{^2_1H}$ collides with a tritium nucleus $\mathbf{^3_1H}$ at a high speed, they give a stable nucleus and a neutron, as in the following nuclear equation: $\mathbf{^2_1H + {}^3_1H \rightarrow {}^4_2He + {}^1_0n}$

a) - Calculate the mass defect.

b)- Calculate the binding energy and binding energy per nucleon (in MeV and joules)

c)- Calculate the energy which can be obtained from 1 mole of deuterium with 1 mole of tritium.

d) - Calculate the mass of coal required to produce the same energy.

mp = $1{,}67263.10^{-27}$ kg; mn = $1{,}67492.10^{-27}$ kg; $N_A = 6{,}023.10^{23}$; me = $9{,}11.10^{-31}$ kg. ^{3}H= 3,016044 u; ^{2}H=2,01404 u; ^{4}He= 4,00260 u; ^{1}n= 1,00866 u; 1 mole (C) gives 240 K joules.

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