Electromagnetic Spectrum:

Radiant potential energy stored in the fields of propagated by electromagnetic radiation including light.

type wave	λ
radio wave	1m – 10^5 Km
micro wave	1mm – 1m
Infrared wave	700nm – 1mm
visible	400nm – 700nm
ultra violet	200 – 400 nm
Vaccum UV	10 – 200 nm
X-ray	10 nm – 10 pm
hard X-ray	10 pm – 100 pm
Gamma-ray	100 pm – 100 fm
Cosmic-ray	less of 100 fm

$$E = h\upsilon = h\frac{c}{\lambda}$$

energy

h : blank constant 6.626×10^{-34} J

c : speed of light 3×10^8 m.s^{-1}

υ : frequancy (Hz)

λ : wave length (m)

Radiant energy (J)

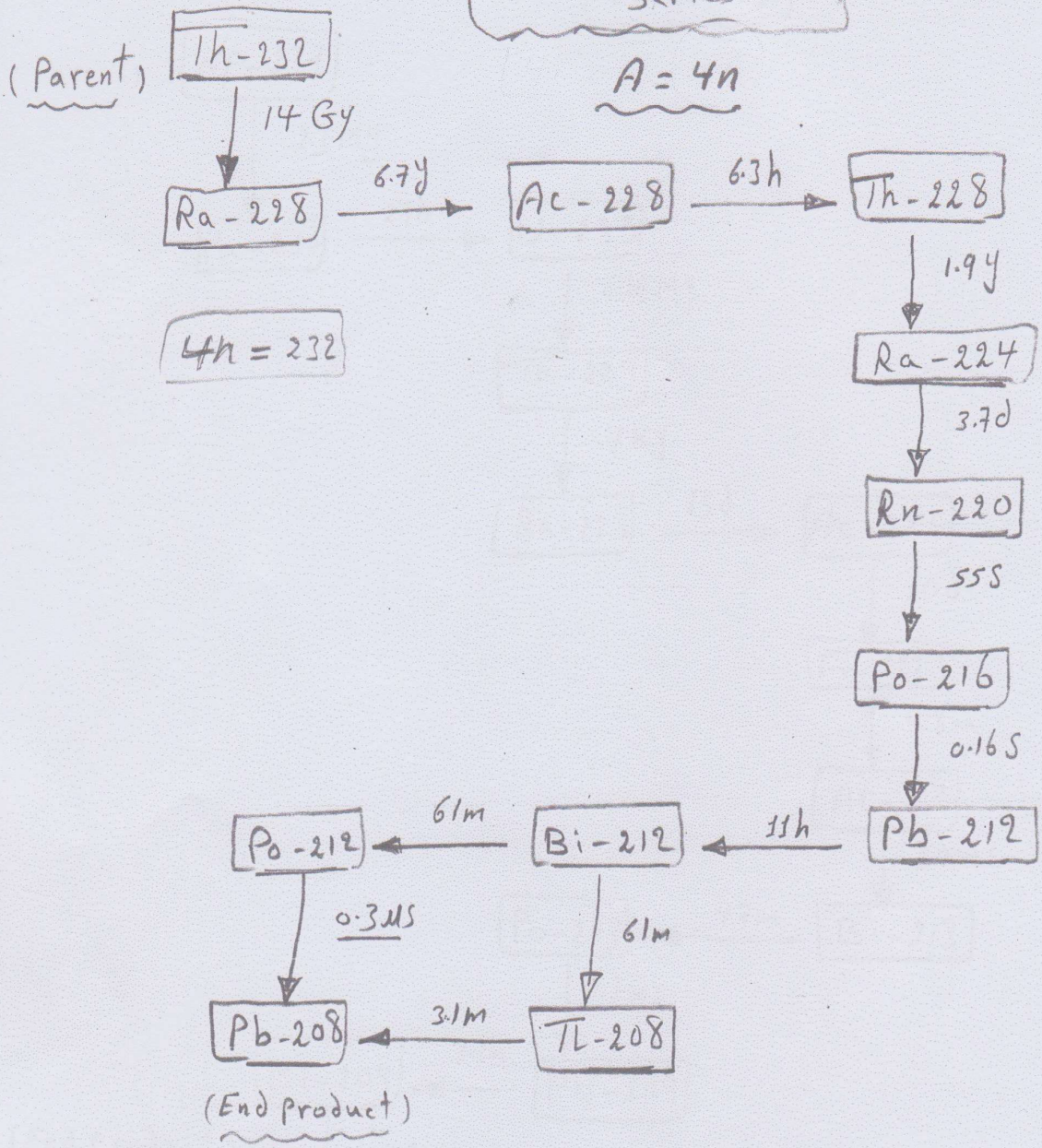
Rate of Radiant energy (watt)
(flux)

flux per unit area (watt.m^{-2})

Thorium Series:

Radioactive decay Series

$A = 4n$



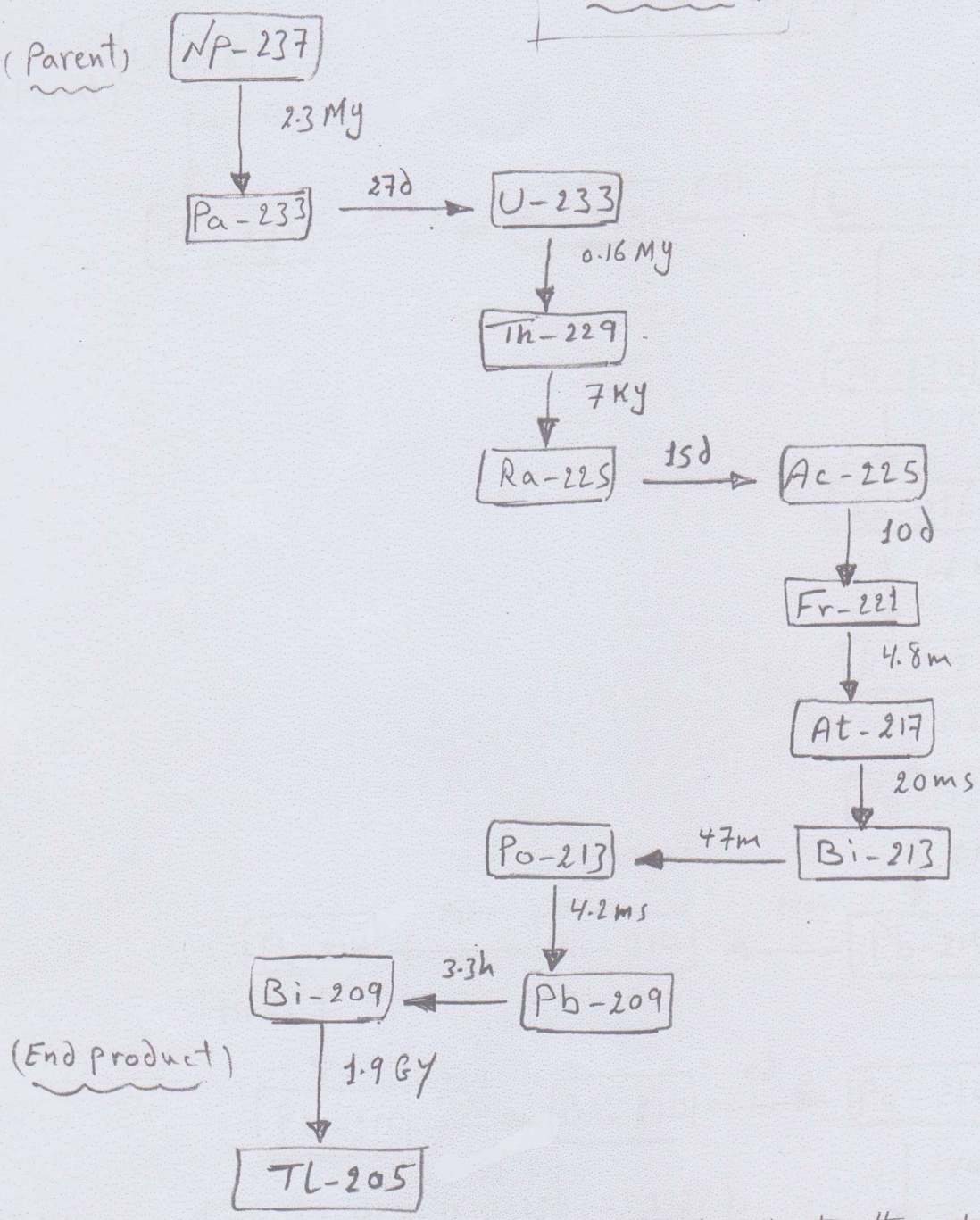
$4n = 232$

Th-232 (abundancy = 100% ; specific activity $S = 2.4 \times 10^5$ dpm g^{-1})

The longest-lived intermediate is 6.7y Ra-228.

Neptunium Series: (Decay chain)

$(A = 4n+1)$

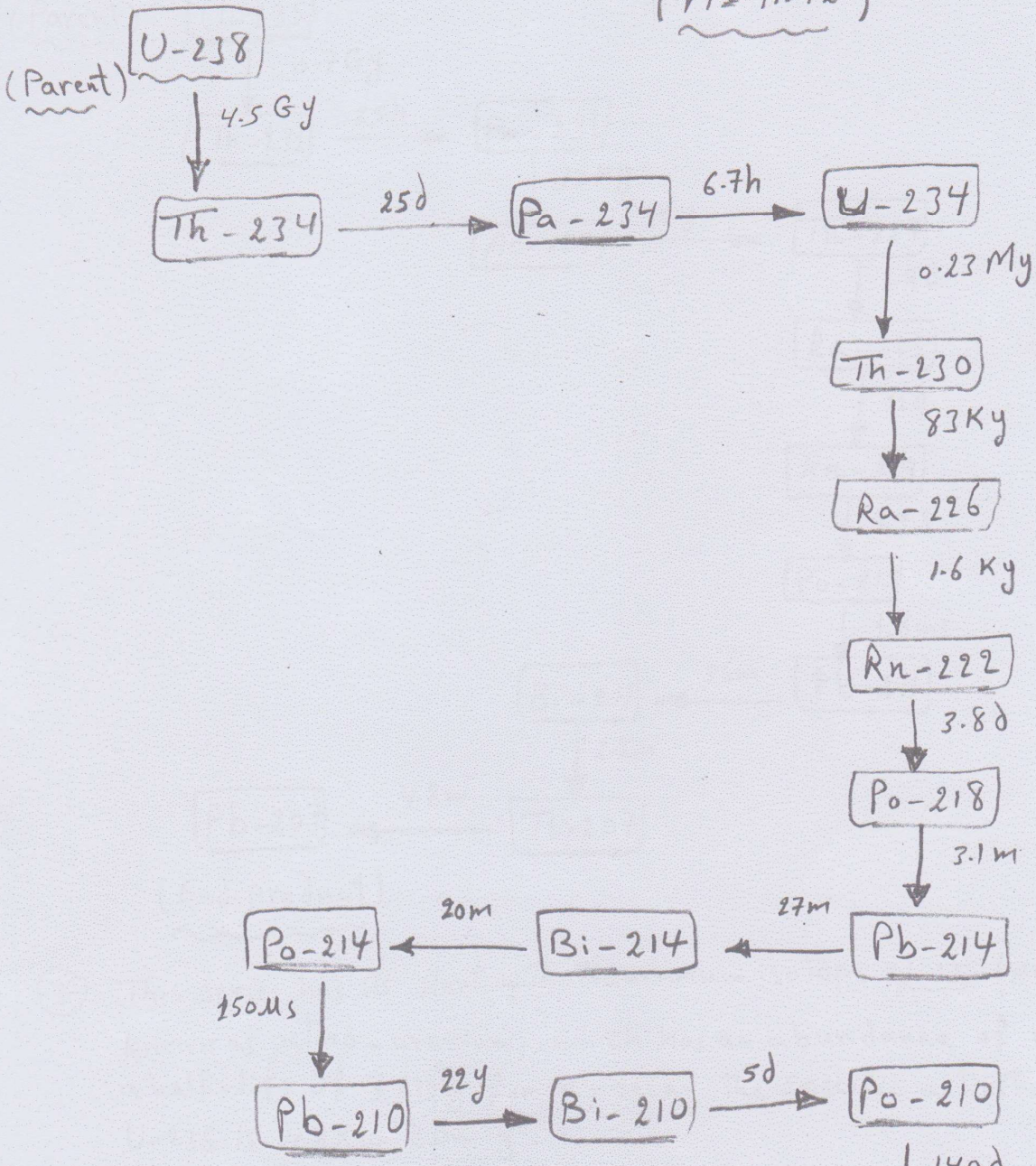


Np-237 as this half-life is considerably shorter than the age of the earth, the Neptunium series is not found as a natural occurrence.

An important nuclide in the Neptunium decay series is the uranium isotope U-233, which has a half-life of 1.6×10^5 y (the most stable intermediate) and, like U-235, is fissionable by slow neutrons.

Uranium Series : (Decay chain)

($A = 4n+2$)



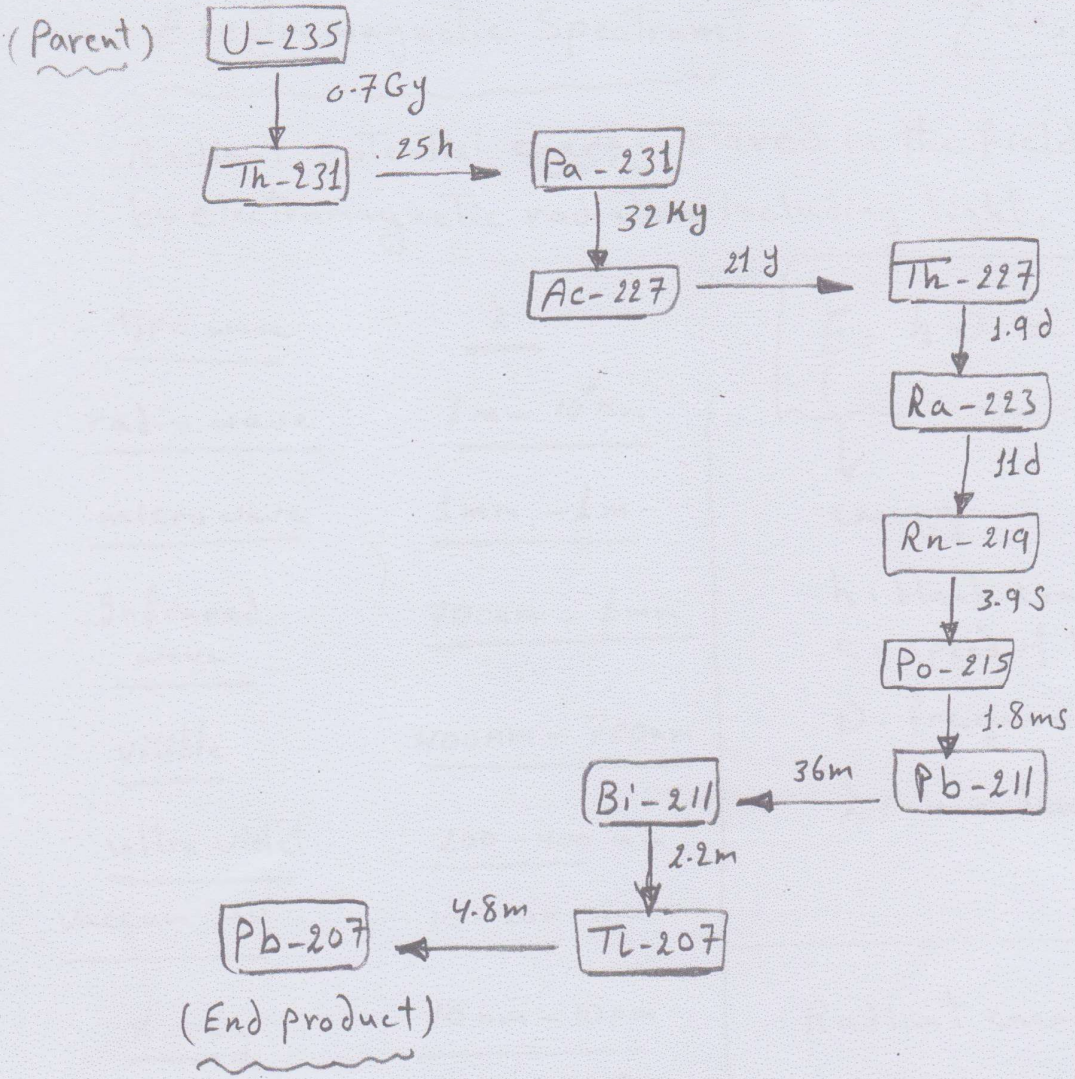
* The parent of this series is U-238 (x = 99.3%), which undergoes α-decay with a half-life of 4.5×10^9 y. The specific activity of uranium, including U-235 & U-234, is 1.522×10^6 α-dpm g^{-1}

* Many of the daughters emit energetic γ-rays, therefore radium has been used as a γ-source in medical treatment of cancer

Actinium Series

(Decay chain)

($A = 4n+3$)



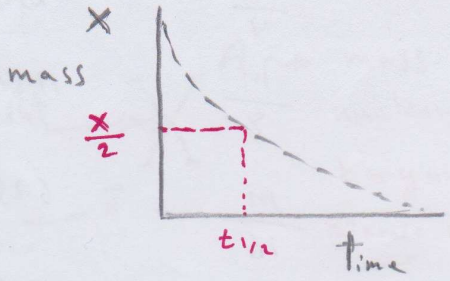
✳ This series has its start with the uranium isotope U-235 (previously known as actino-uranium), which has an abundance of 0.71% and a half-life of 7×10^8 y for α-decay the specific activity of U-235 is 4.8×10^6 dpm·g^{-1}.

✳ The longest-lived protactinium isotope Pa-231 ($t_{1/2} = 3.2 \times 10^4$ y)

✳ Ac-227 ($t_{1/2} = 21$y) is the longest-lived actinium isotope.

Lecture 2

half-life: period of a radioactive isotope is the Time required for one half of the isotope to decay.



Percentage of parent isotope remaining

half-life	mass	% remain
T_i	$m/2$	50%
$2T_i$	$m/4$	25%

$$\text{No. period} = \frac{\text{Time}}{\text{half-life}}$$

After Two half-lives, there will be one fourth the original Sample, after three half-lives one eight the original sample.

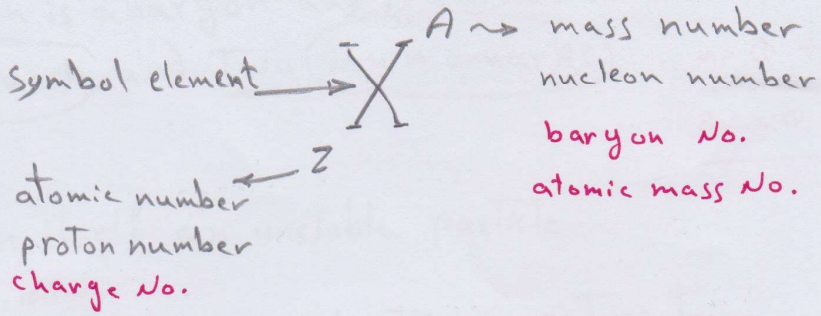
Q1/ A sample of T-3 decays leaving 3.1% of original amount. How long would This take? ($t_{1/2} = 12.3\,y$)

Q2/ A 40g sample of Pu-239 will decay by 80mg in 219y. What is the half-life of Pu-239?

Q3/ If half-life Time for Fr-221 equals to 4.8m, and if you begin with 1mg, what stay with you after 24m.

Q4/ In year 2018 1g of Ra-224 and locked in the basement as time indicator. So if the chemist in the future found 2mg of lead item, so how long the Time has been passed for it? 3.7d

Nucleon: Nucleon, either of the subatomic particles, the proton and the neutron, constituting atomic nuclei.



Protons (positively charged) and neutrons (uncharged) behave identically under the influence of the short-range nuclear force.

1.00728 amu

Proton: A proton is a subatomic particle, symbol (p, Z), with a positive electric charge of +1 and mass slightly less than that of a neutron. ($m_p = 1.673 \times 10^{-27}$ kg) ≡ 938.27 Mev

1.00867 amu

Neutron: A neutron is a subatomic particle, symbol (n)

($m_n = 1.675 \times 10^{-27}$ kg) ≡ 939.57 Mev

Along with neutrons, protons make up the nucleus, held together by the strong force.

e^- 0.00055 amu
1.6×10^{-19} C

$\frac{\wedge}{c}$