

Nuclear Chemistry

1. Define the following:

a. Atomic Number:

the # of protons

b. Atomic Mass:

the # of protons & neutrons

c. Isotope:

varieties of the same element with different
#s of neutrons, changing the atomic mass

d. Nuclear Transmutation:

the conversion of one element to another
by decay

e. Transuranium Elements:

any element above $Z > 92$ or Uranium.
All are man-made elements

f. Nuclear Fission:

splitting into lighter nuclei after absorbing
neutrons, releasing workable

g. Critical Mass:

the minimum mass of fissionable material that
can sustain a nuclear chain reaction

h. Subcritical Mass:

the mass of a fissionable material that is not
enough to sustain a nuclear chain reaction

i. Supercritical Mass:

the mass of fissionable material that is more than
sufficient to sustain a nuclear chain reaction

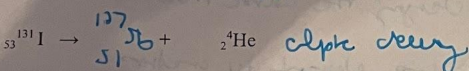
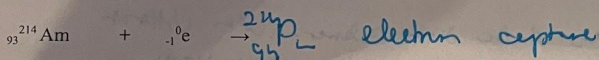
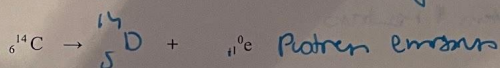
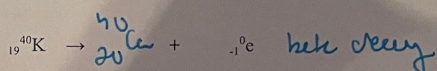
j. Nuclear Fusion:

combining of lighter nuclei into a larger
nucleus

2. What is the heaviest naturally occurring element?

Uranium; U

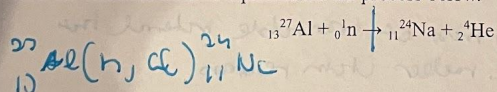
3. Complete the following nuclear reactions and identify the reaction type:



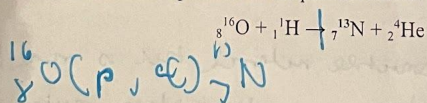
4. What are the three types of electromagnetic radiations emitted to stabilize themselves?

- 1) α ${}_{2}^4\text{He}$ alpha particle
- 2) β electron beta particle
- 3) γ gamma high energy photon

5. Write the balanced nuclear equation for the process below.



6. Write the balanced nuclear equation for the process below.



7. Write the half-life formula for the kinetics of radioactive decay.

$$\frac{0.693}{k} = t_{1/2}$$