Draw a “cartoon” picture of:

$^{1}_{1}H$ (hydrogen)

$^{2}_{1}H$ (sometimes $^{2}_{1}D$ for deuterium)

$^{3}_{2}He$ (helium-three)

$^{4}_{2}He$ (helium-four)

$^{6}_{3}Li$ (lithium-6)

$^{10}_{4}Be$ (beryllium-10)

$^{13}_{6}C$ (carbon-13)

Example: About how long does it take for a sample of $^{3}_{1}H$ (tritium) to decay to 1000^{th} of its original activity? Tritium has a half-life of 12.3 years.

Same question for $^{239}_{94}Pu$? The half-life of plutonium-239 is 24,000 years.

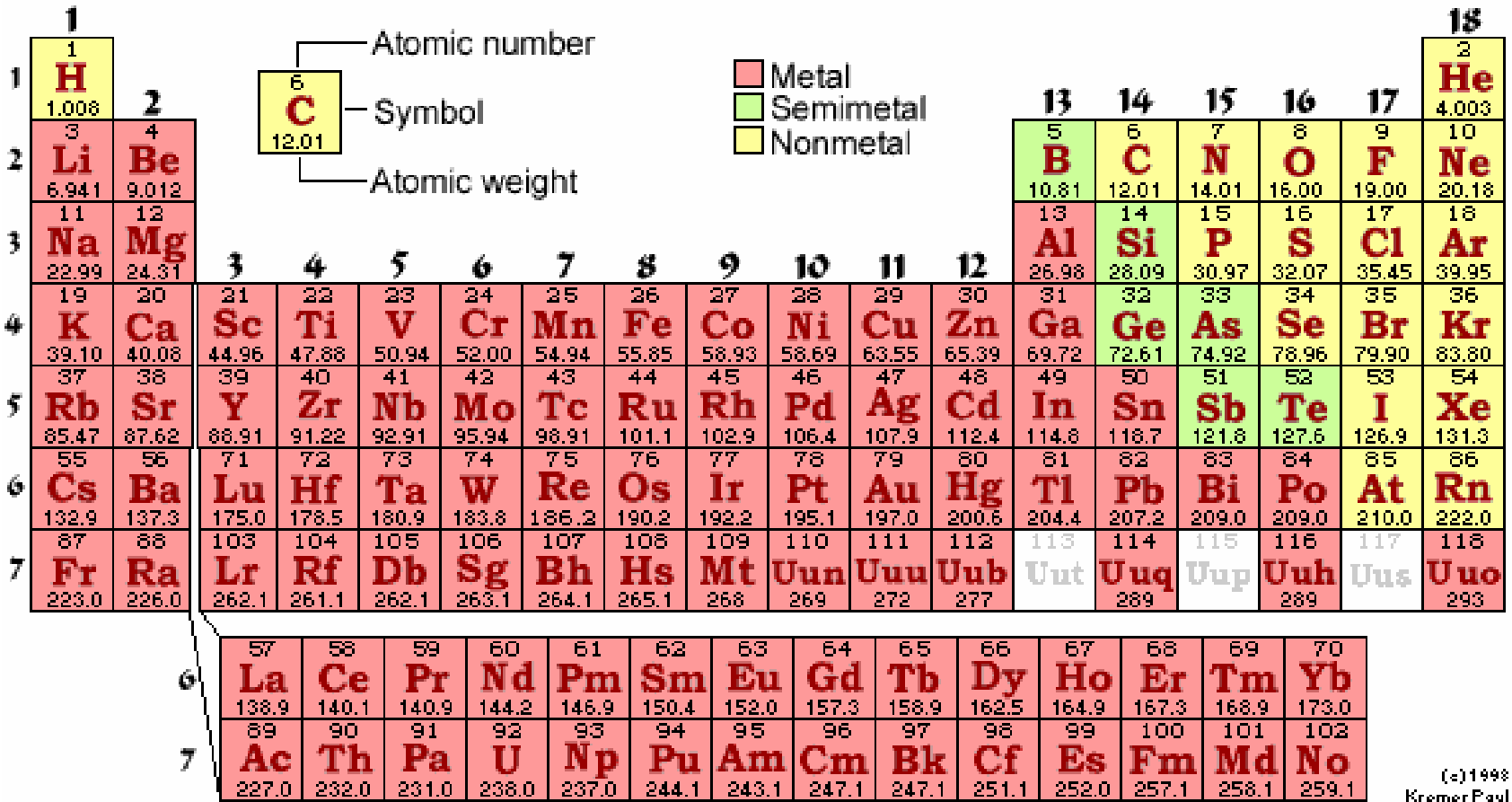
The half-life of $^{99}_{43}Te^{*}$ is 6 hours. If I were injected with 40 mCi of $^{99}_{43}Te^{*}$ at 10AM on Wednesday, how much $^{99}_{43}Te^{*}$ would remain by 10AM on Thursday? (Assume no biological elimination of the isotope.)

How much would remain by 12N on Thursday? (Assume no biological elimination of the isotope.)

What element has 92 protons in its nucleus?

What element has 24 protons in its nucleus?

What element has 68 protons in its nucleus?



Compare and contrast the properties of the e^-, p^+, and n^0. Compare their masses, their electrical charges, and their response to the strong force.

Use these properties to explain why electrons are attracted to the nucleus.

Explain why the strong force is needed to keep protons in the nucleus.

What is the typical size (in meters) of an atom? A nucleus?

$^{238}_{92}U$ undergoes and α decay. What is the resulting decay product?

It turns out that tritium ($^{3}_{1}H$) is radioactive. What decay type would you expect and what would be the decay product?

$^{39}_{19}K$ (potassium) is stable. Make a reasonable guess as to the decay mode and decay product of $^{38}_{19}K$.

$^{22}_{11}Na$ decays to $^{22}_{10}Ne$. What was the decay mode?

Compare the electrical potential energy of the outermost electron in a $^{238}_{92}U$ atom to the electrical potential energy of the uranium nucleus considered as consisting of two equal chunks each containing 46 protons.

Imagine you are trying to prevent terrorists from carrying radioactive materials onto an airplane. What kind of detector would you choose to screen the suitcases with? An alpha detector, a beta detector, a gamma detector, or do you really need all three? Explain.