

Problem Set 15: An Introduction to Nuclear Chemistry

- How many protons and neutrons are in the following isotopes?
 - Sulfur-35
 - Neon-24
 - Indium-113
 - Boron-10
- How does the mass number and atomic number of a radioisotope change when it undergoes alpha decay?
- How does the mass number and atomic number of a radioisotope change when it undergoes beta decay with the release of gamma radiation?
- What isotope results from alpha decay of At-204?
- What isotope results from the beta decay of Sr-90?
- Carbon-14 is used for radioactive carbon dating, and can date artifacts between about 1,000-20,000 years old. Carbon-14 undergoes beta decay. Write an equation to show the decay of Carbon-14.
- Cobalt-60 is useful in radiation therapy and food irradiation. It undergoes beta decay accompanied by emission of gamma radiation. Write an equation to show the decay of Cobalt-60.
- Uranium-238 undergoes a series of nuclear decay reactions (both alpha and beta decay) and ultimately ends up as the stable isotope lead-206. One of the intermediate decay products is radon-222. Radon gas is readily inhaled and exhaled, but if radon undergoes alpha decay while in the lungs it will release ionizing radiation to the delicate tissue. Given this information, complete a-c below.
 - Write a nuclear reaction to show the alpha decay of radon-222.
 - Would you expect the product of this decay to be stable or unstable? Why?
 - The product of this decay is a solid, which becomes trapped in the lungs and causes further damage. If this product is radioactive, what type of decay do you expect it to undergo?