Chem 1 Dr. Casagrande / Mrs. Rinaldi
Chapter 25 Review Sheet

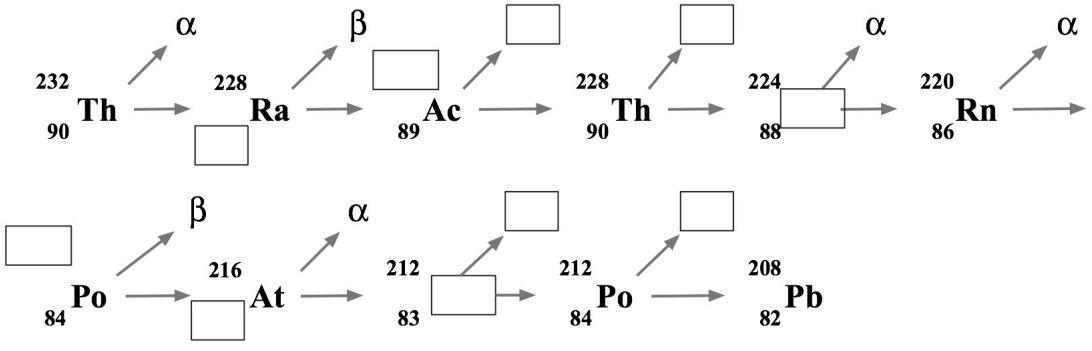
Be able to:

- Describe alpha and beta particles and gamma rays in terms of their composition, relative mass, charge, and penetrating power.
- Explain what makes nuclei stable: Strong Nuclear Force vs. electrostatic repulsion.
- Explain why certain nuclei are radioactive: Band of stability: ${}_{0}^{1}n/{}_{1}^{1}p$ ratio; Atomic number Z > 83
- Describe the four main types of radioactive decay processes: alpha decay, beta decay, positron emission, electron capture
- Write balanced nuclear equations and identify the decay processes or decay products.
- Complete radioactive decay series with the correct atomic numbers, mass numbers, atomic symbols, or α or β decay particles.
- Describe how induced transmutation is used to produce a transuranium element.
- Write balanced induced transmutation equations and determine the identity of missing isotopes or particles.
- Solve problems involving half-life, including determining the amount of material remaining or starting, and the amount of time passed:
- Describe radiochemical dating (carbon-14 article)
- Compare and contrast nuclear fission and fusion
  - Recognize and describe the processes in terms of the particles involved and the roles of the electrostatic force and strong nuclear force in each.
  - Explain why energy is released when either fission or fusion occurs ($E = mc^2$)
  - Explain why the products of fusion and fission are more stable than what they start with
  - Describe thermonuclear reactions and know where they occur
- Explain what a nuclear chain reaction is, what critical mass is, and how they are related.
- Explain how nuclear energy is used to produce electricity.
  - Describe some dangers and problems associated with nuclear energy (i.e. Alchemist/Chernobyl)
  - Explain why fusion is not used in nuclear power plants and what it would take to achieve it.
- Describe several methods of detecting and measuring radiation (film, Geiger counter, scintillation counter)
- Explain how radiation is used in medicine
- Describe the biological harm from exposure to radiation and explain that most radiation exposure is from natural sources.

1. Problems pg. 836-837 #38, 40, 42-46, 48, 51, 56, 57, 59, 62, 64-67, 69-72, 74 (determine what the other product is), 75 (determine what else is produced), 77, 79

Additional Problems:

1. Complete the following radioactive decay series:



2. Technetium-99, which has a half-life of 6.0 hrs, is used as a radiotracer in medical applications. If a patient has 100 mg of Tc-99 injected into her, how much time will pass until 6.25 mg remain in her system?

3. The half-life of radon-222 is 3.82 days. What was the original mass if 0.50 g Rn-222 remains after 11.46 days?

Remember to review all our worksheets and the quiz!

Answers to calculation problems: 77. 3.00 mg, 0.188 mg; 79. 0.629 mg; Additional Problems 2. 24 hrs; 3. 4.0 g