

### Nuclear Chemistry Worksheet 1

1. Write balanced nuclear equations for the following reaction:

(A) Alpha emission by antimony-121

(B) Proton absorbed by uranium-238

(C) Alpha emission by aluminum-27

(D) Beta emission by sulfur-32

(E) Positron emission by arsenic-72

2. Uranium-238 undergoes the following series of decays to form Polonium-218:  $\alpha$ ,  $\beta$ ,  $\beta$ ,  $\alpha$ ,  $\alpha$ ,  $\alpha$ . Write out each step of this decay process.

3. Polonium-210 radioactivity decays by the emission of alpha particles. Its half-life is 138 days.

(A) Write out the decay reaction.

(B) Calculate the rate constant for the decay reaction.

(C) How long will it be before only 5% of the original isotope remains?

4. Phosphorous-32 undergoes beta-decay and has a half-life of 14.3 days.

(A) Calculate the rate constant for this reaction.

(B) How long will it be before 10% of the original amount of Phosphorous-32 remains?

5. Calculate the mass loss and energy change in joules when 1 gram of thorium-230 (229.9837) undergoes alpha decay (4.00150) to produce radon-226 (225.9771).