

Nuclear Chemistry Practice Sheet

Using your knowledge of nuclear chemistry, write the equations for the following processes:

- 1) The alpha decay of iridium-174

- 2) The beta decay of platinum-199

- 3) Positron emission from sulfur-31

- 4) Krypton-76 undergoes electron capture

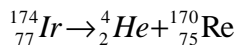
- 5) Write the symbols for an alpha particle, beta particle, gamma ray, and positron.

- 6) If the half-life for the radioactive decay of zirconium-84 is 26 minutes and I start with a 175 gram sample, how much will be left over after 104 minutes?

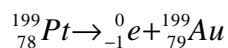
- 7) Why is it difficult to make a fusion reaction occur?

Nuclear Chemistry Practice Sheet – Solutions

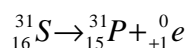
- 1) The alpha decay of iridium-174



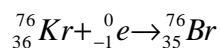
- 2) The beta decay of platinum-199



- 3) Positron emission from sulfur-31



- 4) Krypton-76 undergoes electron capture



- 5) Write the symbols for an alpha particle, beta particle, gamma ray, and positron.

Alpha particle (α) = ${}_2^4\text{He}$

Beta particle (β) = ${}_{-1}^0\text{e}$ (it's the same as an electron!)

Gamma ray (?) = ${}_0^0\text{g}$

Positron = ${}_{+1}^0\text{e}$

- 6) If the half-life for the radioactive decay of zirconium-84 is 26 minutes and I start with a 175 gram sample, how much will be left over after 104 minutes?

Since 104 minutes is equal to four half-lives, the amount of zirconium left over will be:

$$175 \left(\frac{1}{2} \right)^4 = 10.9 \text{ grams}$$

- 7) Why is it difficult to make a fusion reaction occur?

A huge amount of energy is required to make fusion reactions occur – typically on the order of 5×10^7 K. Since that kind of energy isn't just kicking around all over the place, fusion reactions aren't that common.