Name _____

α & β Decay

Practice Problems

1. Write a nuclear equation for the alpha decay of $^{231}_{91}Pa$.

231 → 227 + 4
Pa → Ac + He
91 → 89 + 2

2. Write a nuclear equation for the beta decay of $^{223}_{87}Fr$.

223 → 223 + 0
Fr → Ra + e
87 → 88 + −1

3. Write a nuclear equation for the alpha decay of $^{149}_{62}Sm$.

149 → 145 + 4
Sm → Nd + He
62 → 60 + 2

4. Write a nuclear equation for the beta decay of $^{165}_{61}Pm$.

165 → 165 + 0
Pm → Sm + e
61 → 62 + −1

5. Write a nuclear equation for the alpha decay of $^{249}_{101}Md$.

249 → 245 + 4
Md → Es + He
101 → 99 + 2

Name _____

28-1 Practice Problems

Show work fully!!!

1. The half-life of cesium-137 is 30.2 years. If the initial mass of a sample of cesium-137 is 1.00 kg, how much will remain after 151 years?

0.0313 kg

2. Given that the half-life of carbon-14 is 5730 years, consider a sample of fossilized wood that, when alive, would have contained 24 g of carbon-14. It now contains 1.5 g of carbon-14. How old is the sample?

23,000 yrs
or 2.3×10^{-4} years

3. A 64-g sample of germanium-66 is left undisturbed for 12.5 hours. At the end of that period, only 2.0 g remain. What is the half-life of this material?

64 → 32 → 16 → 8 → 4 → 2
5 half lives
12.5/5 = 2.5 hours

4. With a half-life of 28.8 years, how long will it take for 1 g of strontium-90 to decay to 125 mg?

86.4 years

5. Cobalt-60 has a half-life of 5.3 years. If a pellet that has been in storage for 26.5 years contains 14.5 g of cobalt-60, how much of this radioisotope was present when the pellet was put into storage?

5 half lives!
464 grams

14.5 × 2 = 29 × 2 = 58 × 2 = 116
× 2 = 232
× 2 = 464

Date _____ Class _____

6. Write a nuclear equation for the alpha decay of $^{146}_{62}Sm$.

146 → 142 + 4
Sm → Nd + He
62 → 60 + 2

7. Write a nuclear equation for the beta decay of $^{198}_{85}At$.

198 → 198 + 0
At → Rn + e
85 → 86 + −1

8. Write a nuclear equation for the alpha decay of $^{150}_{64}Gd$.

150 → 146 + 4
Gd → Sm + He
64 → 62 + 2

9. Write a nuclear equation for the beta decay of $^{152}_{54}Xe$.

152 → 152 + 0
Xe → Cs + e
54 → 55 + −1

10. Write a nuclear equation for the beta decay of $^{120}_{55}Cs$.

120 → 120 + 0
Cs → Ba + e
55 → 56 + −1

28-1 Practice Problem

Show work fully!!!

100.1 / 14.3 = 7 $\frac{t}{2}$ lives

6. A 1.000-kg block of phosphorus-32, which has a half-life of 14.3 days, is stored for 100.1 days. At the end of this period, how much phosphorus-32 remains?

$\frac{1,000g}{2^7}$ = 7.8 grams
or .0078 kg

7. A sample of air from a basement is collected to test for the presence of radon-222, which has a half-life of 3.8 days. However, delays prevent the sample from being tested until 7.6 days have passed. Measurements indicate the presence of 6.5 μg of radon-222. How much radon-222 was present in the sample when it was initially collected?

26 μg

8. A 0.500 *M* solution of iodine-131, which has a half-life of 8.0 days, is prepared. After 40. days, how much iodine will remain in 1.0 L of solution? Express the result in moles.

0.016 $\frac{mol}{L}$

9. The half-life of sodium-25 is 1.0 minute. Starting with 1 kg of this isotope, how much will remain after half an hour?

30 half lives

$\frac{1000g}{2^{30}}$ = 9.3×10^{-7} g.
or 9.3×10^{-10} kg

10. What is the half-life of polonium-214 if, after 820. seconds, a 1.0-g sample decays to 31.25 mg?

164 seconds