

Name: \_\_\_\_\_  
Period: \_\_\_\_\_

### Nuclear Chemistry

(1) Give the Nuclide symbol for the following atoms.

(a) Carbon-13

(b) Uranium-238

(c) Silver-108

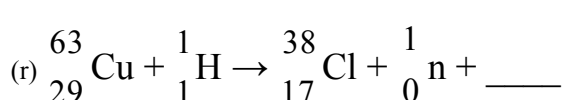
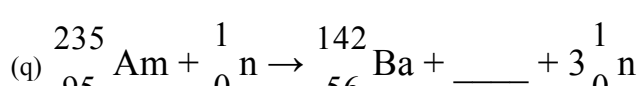
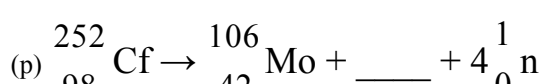
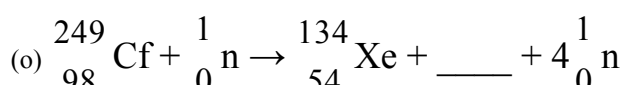
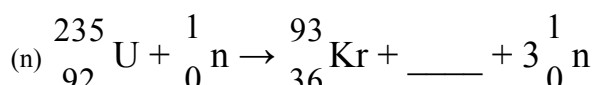
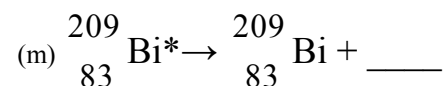
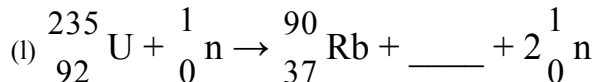
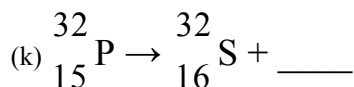
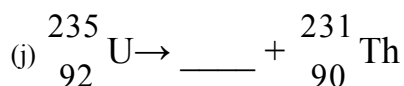
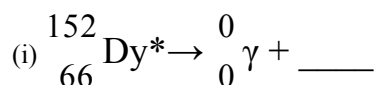
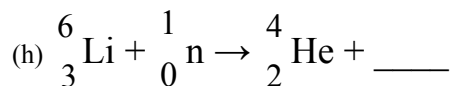
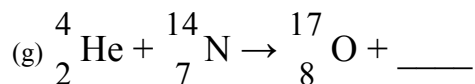
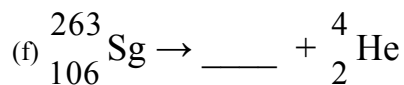
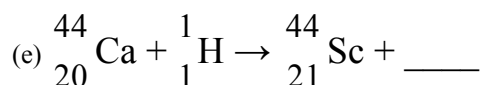
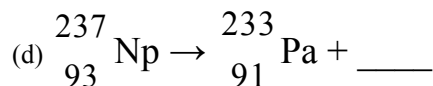
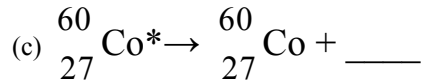
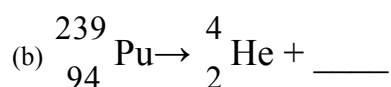
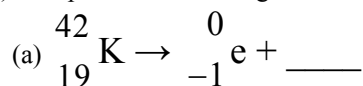
(d) Antimony-118

(e) Lead-208

(f) Argon-40

(2) Discuss and compare alpha radiation, beta radiation, and gamma radiation.

(3) Complete the following nuclear reactions.



- (4) Carbon-14 has a half-life of 5730 years.
- Determine the mass of a 128 g sample that would remain after 17190 years.
  - Determine the time required for an 80 g sample to decay to 2.5 g.
- (5) Cadmium-109 has a half-life of 435 days.
- Determine the mass of a 300 g sample that would remain after 3480 days.
  - Determine the time required for a 200 g sample to decay to 12.5 g.
  - Determine the amount of time required for sample to decay to 12.5% of the original amount.
- (6) Sodium-24 has a half-life of 15.02 hours.
- After 60.08 hours, 20 g of a sample remains. What was the mass of the original sample?
  - Determine the amount time required to an 8.00 mg sample to decay to 0.125 mg.
  - Determine the amount of time required for a sample to decay to one-eighth of the original amount.
- (7) A 50.0 g sample of Sulphur-35 decays to 6.25 g in 261.6 days. What is the half-life of this isotope?

(8) Uranium-235 has a half-life of  $7.0 \times 10^8$  years.

(a) Determine the mass of a 60 g sample that would remain after  $3.5 \times 10^9$  years.

(b) Determine the amount of time required for an 8.00 g sample to decay to 1.00 g.

(c) Determine the amount of time required for a sample to decay to one-quarter to the original amount.

(9) A sample of thorium-227 decays to one-eighth of its original mass in 56.16 days. What is the half-life of thorium-227?