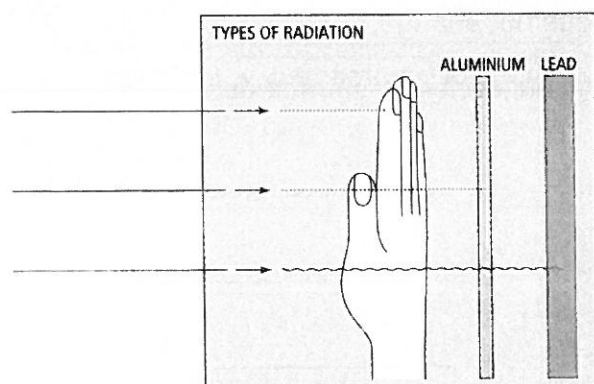


Use with textbook pages 294–297.

Alpha, beta, and gamma radiation

1. Label the following diagram. Identify the penetrating power of the three forms of radioactive decay products: alpha particle, beta particle, and gamma ray.



2. Indicate whether the description is referring to an alpha particle, a beta particle, or a gamma ray. The description can refer to more than one of the forms of radiation.

- (a) ${}^0_0\gamma$ _____
- (b) ${}^0_{-1}\beta$ or ${}^0_{-1}e$ _____
- (c) $\frac{4}{2}\alpha$ or ${}^4_2\text{He}$ _____
- (d) has a charge of 0 _____
- (e) has a charge of 1- _____
- (f) has a charge of 2+ _____
- (g) is a helium nucleus _____
- (h) is a high-speed electron _____
- (i) is emitted from the nucleus _____
- (j) is emitted only during beta decay _____
- (k) is emitted only during alpha decay _____
- (l) can be stopped by aluminum foil _____
- (m) is emitted only during gamma decay _____
- (n) is affected by electric and magnetic fields _____
- (o) is not affected by electric and magnetic fields _____
- (p) is a high energy wave with short wavelengths _____
- (q) is the highest energy form of electromagnetic radiation _____
- (r) has low penetrating power (can be stopped by a single piece of paper) _____
- (s) has the greatest penetrating power (can only be stopped by lead or concrete) _____

Use with textbook pages 286–299.

Radioactive decay and nuclear equations

Remember the following two rules when working with nuclear equations:

- I. The sum of the mass numbers does not change.
- II. The sum of the charges in the nucleus does not change.

Identify each nuclear equation as alpha decay, beta decay, or gamma decay, and then complete the nuclear equation.

1. $^{32}_{15}\text{P}$ -----> $^{32}_{16}\text{S}$ + _____
2. $^{218}_{84}\text{Po}$ -----> _____ + ^4_2He
3. _____ -----> $^{18}_5\text{Ar}$ + $^0_{-1}e$
4. $^{24}_{12}\text{Mg}^*$ -----> _____ + $^0_0\gamma$
5. $^{234}_{91}\text{Pa}$ -----> _____ + $^4_2\alpha$
6. $^{141}_{58}\text{Ce}$ -----> _____ + $^0_{-1}e$
7. $^{216}_{84}\text{Po}$ -----> _____ + $^0_{-1}\beta$
8. $^{20}_9\text{F}$ -----> $^{20}_{10}\text{Ne}$ + _____
9. $^{58}_{26}\text{Fe}^*$ -----> $^{58}_{26}\text{Fe}$ + _____
10. _____ -----> $^{221}_{87}\text{Fr}$ + $^4_2\alpha$
11. $^{149}_{64}\text{Gd}^*$ -----> _____ + $^0_0\gamma$
12. $^{226}_{86}\text{Ra}$ -----> $^{222}_{86}\text{Rn}$ + _____
13. _____ -----> $^{212}_{82}\text{Pb}$ + $^0_{-1}\beta$
14. $^{214}_{83}\text{Bi}$ -----> $^{210}_{81}\text{Tl}$ + _____
15. _____ -----> $^{254}_{98}\text{Cf}$ + $^0_0\gamma$