

Review Questions

- Which particle has the greatest mass?
 (1) an alpha particle (3) an electron
 (2) a beta particle (4) a neutron
- In the following equation, which particle is represented by the letter X?

$${}^{14}_6\text{C} \rightarrow {}^{14}_7\text{N} + \text{X}$$

 (1) an alpha particle (3) a neutron
 (2) a beta particle (4) a proton
- Which radioactive emanations have a charge of 2+?
 (1) alpha particles (3) gamma rays
 (2) beta particles (4) neutrons
- Which species has a negative charge?
 (1) a lithium ion (3) an aluminum ion
 (2) an alpha particle (4) a beta particle
- According to Reference Table N in the *Reference Tables for Physical Setting/ Chemistry*, a product of the radioactive decay of Ra-226 is
 (1) ${}^4_2\text{He}$ (2) ${}^{226}_{89}\text{U}$ (3) ${}^0_{-1}\text{e}$ (4) ${}^{230}_{90}\text{U}$
- Which equation represents nuclear disintegration resulting in release of a beta particle?
 (1) ${}^{220}_{87}\text{Fr} + {}^4_2\text{He} \rightarrow {}^{224}_{89}\text{Ac}$
 (2) ${}^{239}_{94}\text{Pu} \rightarrow {}^{235}_{92}\text{U} + {}^4_2\text{He}$
 (3) ${}^{32}_{15}\text{P} + {}^0_{-1}\text{e} \rightarrow {}^{32}_{14}\text{Si}$
 (4) ${}^{198}_{79}\text{Au} \rightarrow {}^{198}_{80}\text{Hg} + {}^0_{-1}\text{e}$
- In the nuclear equation ${}^{232}_{90}\text{Th} \rightarrow {}^{228}_{88}\text{Ra} + \text{X}$, the letter X represents
 (1) an alpha particle (3) a gamma ray
 (2) a beta particle (4) a neutron
- In the reaction ${}^{238}_{92}\text{U} \rightarrow \text{X} + {}^4_2\text{He}$, the particle represented by X is
 (1) ${}^{234}_{90}\text{Th}$ (2) ${}^{234}_{92}\text{U}$ (3) ${}^{238}_{93}\text{Np}$ (4) ${}^{242}_{94}\text{Pu}$
- Which nuclear equation represents beta decay?
 (1) ${}^{27}_{13}\text{Al} + {}^4_2\text{He} \rightarrow {}^{30}_{15}\text{P} + {}^1_0\text{n}$
 (2) ${}^{238}_{92}\text{U} \rightarrow {}^{234}_{90}\text{Th} + {}^4_2\text{He}$
 (3) ${}^{14}_6\text{C} \rightarrow {}^{14}_7\text{N} + {}^0_{-1}\text{e}$
 (4) ${}^{37}_{18}\text{Ar} + {}^0_{-1}\text{e} \rightarrow {}^{37}_{17}\text{Cl}$
- In which reaction does the letter X represent an alpha particle?
 (1) ${}^{226}_{88}\text{Ra} \rightarrow {}^{222}_{86}\text{Rn} + \text{X}$ (3) ${}^{230}_{90}\text{Th} \rightarrow {}^{230}_{88}\text{Ra} + \text{X}$
 (2) ${}^{234}_{90}\text{Th} \rightarrow {}^{235}_{91}\text{Pa} + \text{X}$ (4) ${}^{234}_{92}\text{U} \rightarrow {}^{234}_{90}\text{Th} + \text{X}$
- What does the X represent in the following reaction?

$${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0\text{n} + \text{X}$$

 (1) a released electron
 (2) another neutron
 (3) energy converted from mass
 (4) mass converted from energy
- Which of the following nuclear reactions is classified as alpha decay?
 (1) ${}^{14}_6\text{C} \rightarrow {}^{14}_7\text{N} + {}^0_{+1}\text{e}$ (3) ${}^{226}_{88}\text{Ra} \rightarrow {}^{222}_{86}\text{Rn} + {}^4_2\text{He}$
 (2) ${}^{42}_{19}\text{K} \rightarrow {}^{42}_{20}\text{Ca} + {}^0_{-1}\text{e}$ (4) ${}^3_1\text{H} \rightarrow {}^0_{-1}\text{e} + {}^4_2\text{He}$
- Which isotope is represented by the X when the following equation is correctly balanced?

$${}^{14}_7\text{N} + {}^4_2\text{He} \rightarrow {}^1_1\text{H} + \text{X}$$

 (1) ${}^{17}_2\text{O}$ (2) ${}^{17}_8\text{O}$ (3) ${}^{17}_9\text{F}$ (4) ${}^{19}_9\text{F}$
- Which element has no stable isotopes?
 (1) ${}_{27}\text{Co}$ (2) ${}_{51}\text{Sb}$ (3) ${}_{90}\text{Th}$ (4) ${}_{82}\text{Pb}$
- Write balanced nuclear equations for each of the following:
 (a) beta decay of Pb-210
 (b) beta decay of Cs-137
 (c) alpha decay of Rn-222
 (d) alpha decay of Au-185
 (e) positron emission of Fe-53
 (f) positron emission of Ca-37