

- A sample of which radioisotope emits particles having the greatest mass?
1) ^{137}Cs 2) ^{53}Fe 3) ^{220}Fr 4) ^3H
- Given the equation representing a nuclear reaction in which X represents a nuclide:
$$^{232}_{90}\text{Th} \rightarrow ^4_2\text{He} + X$$

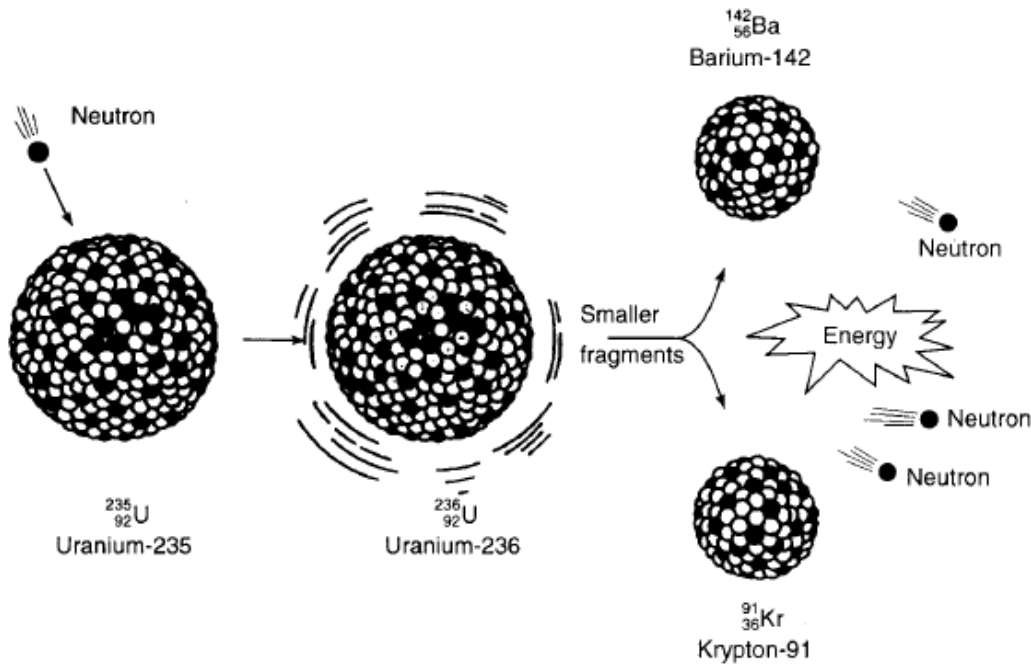
Which nuclide is represented by X ?

1) $^{236}_{92}\text{Ra}$ 2) $^{228}_{88}\text{Ra}$ 3) $^{236}_{92}\text{U}$ 4) $^{228}_{88}\text{U}$
- Which nuclear emission is negatively charged?
1) an alpha particle 2) a beta particle
3) a neutron 4) a positron
- Positrons and beta particles have
1) the same charge and the same mass
2) the same charge and different masses
3) different charges and the same mass
4) different charges and different masses
- Which nuclear emission has the greatest penetrating power?
1) proton 2) beta particle
3) gamma radiation 4) positron
- Which phrase describes the decay modes and the half-lives of K-37 and K-42?
1) the same decay mode but different half-lives
2) the same decay mode and the same half-life
3) different decay modes and different half-lives
4) different decay modes but the same half-life
- A radioactive isotope has a half-life of 2.5 years. Which fraction of the original mass remains unchanged after 10. years?
1) $1/2$ 2) $1/4$ 3) $1/8$ 4) $1/16$
- After decaying for 48 hours, $\frac{1}{16}$ of the original mass of a radioisotope sample remains unchanged. What is the half-life of this radioisotope?
1) 3.0 h 2) 9.6 h 3) 12 h 4) 24 h
- Which term represents a nuclear reaction?
1) combustion 2) fermentation
3) transmutation 4) saponification
- Which nuclear equation represents a natural transmutation?
1) $^9_4\text{Be} + ^1_1\text{H} \rightarrow ^6_3\text{Li} + ^4_2\text{He}$
2) $^{27}_{13}\text{Al} + ^4_2\text{He} \rightarrow ^{30}_{15}\text{P} + ^1_0\text{n}$
3) $^{14}_7\text{N} + ^4_2\text{He} \rightarrow ^{17}_8\text{O} + ^1_1\text{H}$
4) $^{235}_{92}\text{U} \rightarrow ^{231}_{90}\text{Th} + ^4_2\text{He}$
- Which equation represents a transmutation reaction?
1) $^{239}_{92}\text{U} \rightarrow ^{239}_{92}\text{U} + ^0_0\gamma$
2) $^{14}_6\text{C} \rightarrow ^{14}_7\text{N} + ^0_{-1}\text{e}$
3) $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$
4) $n\text{C}_2\text{H}_4 \xrightarrow{\text{catalyst}} (-\text{C}_2\text{H}_4-)n$
- What occurs in both fusion and fission reactions?
1) Small amounts of energy are converted into large amounts of matter.
2) Small amounts of matter are converted into large amounts of energy.
3) Heavy nuclei are split into lighter nuclei.
4) Light nuclei are combined into heavier nuclei.
- Given the balanced equation representing a nuclear reaction:
$$^{235}_{92}\text{U} + ^1_0\text{n} \rightarrow ^{142}_{56}\text{Ba} + ^{91}_{36}\text{Kr} + 3X + \text{energy}$$

Which particle is represented by X ?

1) $^0_{-1}\text{e}$ 2) ^1_1H 3) ^4_2H 4) ^1_0n
- Which balanced equation represents a fusion reaction?
1) $^{235}_{92}\text{U} + ^1_0\text{n} \rightarrow ^{93}_{36}\text{Kr} + ^{140}_{56}\text{Ba} + 3^1_0\text{n}$
2) $^2_1\text{H} + ^3_1\text{H} \rightarrow ^4_2\text{He} + ^1_0\text{n}$
3) $^{14}_7\text{N} + ^4_2\text{He} \rightarrow ^{17}_8\text{O} + ^1_1\text{H}$
4) $^{226}_{88}\text{Ra} \rightarrow ^{222}_{86}\text{Rn} + ^4_2\text{He}$
- During a nuclear reaction, mass is converted into
1) charge 2) energy
3) isomers 4) volume
- Which radioisotope is used in dating geological formations?
1) I-131 2) U-238
3) Ca-37 4) Fr-220

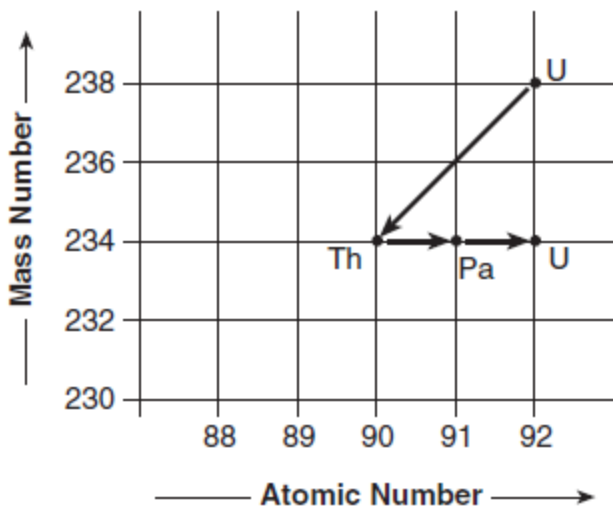
17. The diagram below represents a nuclear reaction in which a neutron bombards a heavy nucleus.



Which type of reaction does the diagram illustrate?

- 1) fission 2) fusion 3) alpha decay 4) beta decay

18. The chart below shows the spontaneous nuclear decay of U-238 to Th-234 to Pa-234 to U-234.



What is the correct order of nuclear decay modes for the change from U-238 to U-234?

- 1) β^- decay, γ decay, β^- decay
 2) β^- decay, β^- decay, α decay
 3) α decay, α decay, β^- decay
 4) α decay, β^- decay, β^- decay

19. Which nuclides are used to date the remains of a once-living organism?

- 1) C-14 and C-12 2) Co-60 and Co-59
 3) I-131 and Xe-131 4) U-238 and Pb-206

20. Which nuclide is paired with a specific use of that nuclide?

- 1) carbon-14, treatment of cancer
 2) cobalt-60, dating of rock formations
 3) iodine-131, treatment of thyroid disorders
 4) uranium-238, dating of once-living organisms

21. Which risk is associated with using nuclear fission to produce energy in a power plant?

- 1) depletion of hydrocarbons
 2) depletion of atmospheric oxygen
 3) exposure of workers to radiation
 4) exposure of workers to sulfur dioxide

22. A serious risk factor associated with the operation of a nuclear power plant is the production of

- 1) acid rain
 2) helium gas
 3) greenhouse gases, such as CO_2
 4) radioisotopes with long half-lives

23. What is a problem commonly associated with nuclear power facilities?

- 1) A small quantity of energy is produced.
- 2) Reaction products contribute to acid rain.
- 3) It is impossible to control nuclear fission.
- 4) It is difficult to dispose of wastes.

24. One benefit of nuclear fission reactions is

- 1) nuclear reactor meltdowns
- 2) storage of waste materials
- 3) biological exposure
- 4) production of energy

25. Which statement explains why nuclear waste materials may pose a problem?

- 1) They frequently have short half-lives and remain radioactive for brief periods of time.
 - 2) They frequently have short half-lives and remain radioactive for extended periods of time.
 - 3) They frequently have long half-lives and remain radioactive for brief periods of time.
 - 4) They frequently have long half-lives and remain radioactive for extended periods of time.
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Answer Key
Nuclear Review Questions

1. 3
 2. 2
 3. 2
 4. 3
 5. 3
 6. 3
 7. 4
 8. 3
 9. 3
 10. 4
 11. 2
 12. 2
 13. 4
 14. 2
 15. 2
 16. 2
 17. 1
 18. 4
 19. 1
 20. 3
 21. 3
 22. 4
 23. 4
 24. 4
 25. 4
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