

**25**

# NUCLEAR CHEMISTRY

## Practice Problems

In your notebook, solve the following problems.

### SECTION 25.1 NUCLEAR RADIATION

- What happens to the mass number and atomic number of an atom that undergoes beta decay?
- A nuclide of an element undergoes alpha particle decay. How do the atomic number and mass number of the particle change?
- Give the composition of the nucleus of the following isotopes.
  - $^{224}_{86}\text{Rn}$
  - $^{133}_{55}\text{Cs}$
  - $^{132}_{53}\text{I}$
- Complete each of the following equations.
  - $^{232}_{90}\text{Th} \rightarrow ^{228}_{88}\text{Ra} + ?$
  - $^{226}_{88}\text{Ra} \rightarrow ^{222}_{86}\text{Rn} + ?$
  - $^{234}_{90}\text{Th} \rightarrow ^{230}_{88}\text{Ra} + ?$

### SECTION 25.2 NUCLEAR TRANSFORMATIONS

- Write a nuclear equation for the following radioactive processes.
  - alpha decay of francium-223
  - electron capture by beryllium-7
  - beta emission by argon-37
  - positron emission by boron-12
- Complete the equations for these transmutation reactions.
  - $^{24}_{12}\text{Mg} + ^4_2\text{He} \rightarrow ^{28}_{14}\text{Si} + ?$
  - $^{238}_{92}\text{U} + ^4_2\text{He} \rightarrow ? + ^{234}_{90}\text{Th} + ^1_0\text{n}$
  - $^{240}_{94}\text{Pu} + ^1_0\text{n} \rightarrow ? + ^{140}_{54}\text{Xe}$
  - $^{235}_{92}\text{U} \rightarrow ^{141}_{54}\text{Xe} + ? + 3^1_0\text{n}$
  - $^1_0\text{n} + ^{235}_{92}\text{U} \rightarrow ^{141}_{54}\text{Xe} + ^{92}_{38}\text{Sr} + 2^1_0\text{n}$
- Po-214 has a relatively short half-life of 164 s. How many micrograms would it take for 0.05 g of this isotope to decay to 0.25 g?
- How many days does it take for 10. g of gadolinium-153 to decay to 1.0 g? The half-life of gadolinium-153 is 17 days.
- By approximately what factor would the mass of a sample of copper-66 decrease in 50 minutes? The half-life of copper-66 is 5.48 min.
- In 5.48 minutes, 1.00 g of argon-39 decays to leave only 0.12 g. What is the half-life of argon-39?

# Answer Key For 25 Nuclear Chemistry

**JG Myers**



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### **Table of Contents Answer Key For 25 Nuclear Chemistry**

1. Understanding the eBook Answer Key For 25 Nuclear Chemistry
  - The Rise of Digital Reading Answer Key For 25 Nuclear Chemistry
  - Advantages of eBooks Over Traditional Books
2. Identifying Answer Key For 25 Nuclear Chemistry
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Answer Key For 25 Nuclear Chemistry
  - User-Friendly Interface
4. Exploring eBook Recommendations from Answer Key For 25 Nuclear Chemistry
  - Personalized Recommendations
  - Answer Key For 25 Nuclear Chemistry User Reviews and Ratings
  - Answer Key For 25 Nuclear Chemistry and Bestseller Lists

5. Accessing Answer Key For 25 Nuclear Chemistry Free and Paid eBooks
  - Answer Key For 25 Nuclear Chemistry Public Domain eBooks
  - Answer Key For 25 Nuclear Chemistry eBook Subscription Services
  - Answer Key For 25 Nuclear Chemistry Budget-Friendly Options
6. Navigating Answer Key For 25 Nuclear Chemistry eBook Formats
  - ePub, PDF, MOBI, and More
  - Answer Key For 25 Nuclear Chemistry Compatibility with Devices
  - Answer Key For 25 Nuclear Chemistry Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Answer Key For 25 Nuclear Chemistry
  - Highlighting and Note-Taking Answer Key For 25 Nuclear Chemistry
  - Interactive Elements Answer Key For 25 Nuclear Chemistry
8. Staying Engaged with Answer Key For 25 Nuclear Chemistry
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Answer Key For 25 Nuclear Chemistry
9. Balancing eBooks and Physical Books Answer Key For 25 Nuclear Chemistry
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Answer Key For 25 Nuclear Chemistry
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Answer Key For 25 Nuclear Chemistry
  - Setting Reading Goals Answer Key For 25 Nuclear Chemistry
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Answer Key For 25 Nuclear Chemistry
  - Fact-Checking eBook Content of Answer Key For 25 Nuclear Chemistry
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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