Isotope Practice Worksheet

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Part 1: Building a Foundation

What defines an isotope of an element?

Hint: Consider the particles that make up an atom.

- ◯ Different number of electrons
- ◯ Different number of protons
- ◯ Different number of neutrons
- ◯ Different atomic number

Which of the following statements are true about isotopes?

Hint: Think about the characteristics that define isotopes.

- ☐ Isotopes have the same number of protons.
- ☐ Isotopes have different atomic numbers.
- ☐ Isotopes have different mass numbers.
- ☐ Isotopes have the same number of neutrons.

Explain how isotopes of an element are similar and how they are different.

Hint: Consider their atomic structure and properties.

List two examples of isotopes and their applications.

Hint: Think about common isotopes used in various fields.

1. Example 1 and application

2. Example 2 and application

Part 2: Comprehension and Application

Which isotope is commonly used in carbon dating?

Hint: Consider the isotopes of carbon.

- ◯ Carbon-12
- ◯ Carbon-13
- ◯ Carbon-14
- ◯ Carbon-15

Which of the following are applications of isotopes?

Hint: Think about various fields where isotopes are utilized.

- ☐ Medical imaging
- ☐ Archaeological dating
- ☐ Nuclear energy
- ☐ Plastic manufacturing

Describe the role of isotopes in medical diagnostics.

Hint: Consider how isotopes are used in imaging and treatment.

If an element has an atomic number of 8 and a mass number of 18, how many neutrons does it have?

Hint: Use the formula: Neutrons = Mass number - Atomic number.

- ◯ 8
- ◯ 10
- ◯ 18
- ◯ 26

Which isotopes would be suitable for use in a nuclear reactor?

Hint: Consider the isotopes that are known for their fission properties.

- ☐ Uranium-235
- ☐ Uranium-238
- ☐ Carbon-14
- ☐ Hydrogen-1

Explain how isotopic abundance affects the calculation of atomic weight.

Hint: Consider the average mass of isotopes in a sample.

Part 3: Analysis, Evaluation, and Creation

Which factor primarily determines the stability of an isotope?

Hint: Think about the relationship between protons and neutrons.

- ◯ Number of electrons
- ◯ Ratio of protons to neutrons
- ◯ Total number of protons
- ◯ Atomic number

Analyze the following isotopes and identify which are likely to be radioactive:

Hint: Consider the stability of the isotopes listed.

- [ ] Carbon-12
- [ ] Carbon-14
- [ ] Uranium-235
- [ ] Helium-4

Compare and contrast the isotopes Uranium-235 and Uranium-238 in terms of their uses and stability.

Hint: Think about their applications in energy and weapons.

Which isotope would be most suitable for treating cancer through radiation therapy?

Hint: Consider isotopes known for their therapeutic properties.

- ◯ Iodine-131
- ◯ Carbon-12
- ◯ Helium-4
- ◯ Oxygen-16

Evaluate the following isotopes for their potential environmental impact:

Hint: Consider the isotopes' radioactivity and stability.

- [ ] Plutonium-239
- [ ] Tritium
- [ ] Lead-206
- [ ] Radon-222

Propose a new application for isotopes in technology or industry, explaining the rationale behind your proposal.

Hint: Think about innovative uses of isotopes.