

Atomic Structure, Isotopes & Atomic Mass

INSTRUCTOR / SELF-STUDY ANSWER KEY

Answers and reasoning appear in red. Use these to discuss why incorrect choices are incorrect.

Part A — Concept checks

1. What determines the identity of an element?

Answer: B. proton count — Atomic number is the proton count.

2. How many neutrons are in carbon-14?

Answer: B. 8 — $14 - 6 = 8$.

3. How many electrons are in Mg^{2+} ?

Answer: A. 10 — A neutral Mg atom has 12 electrons and Mg^{2+} has lost two.

4. Two isotopes of the same element differ in what?

Answer: C. neutrons — Isotopes share Z but have different neutron counts.

5. An atom contains 11 protons and 12 neutrons. Its mass number is...

Answer: D. 23 — $A = 11 + 12 = 23$.

6. What does the periodic-table atomic mass typically represent?

Answer: B. a weighted isotope average — Natural isotope abundances determine the weighted mean.

Part B — Application and explanation

7. How many neutrons are in chlorine-37?

Model solution: Chlorine has atomic number 17, so neutrons = $37 - 17 = 20$. A neutral chlorine-37 atom also has 17 electrons. Final answer: 20 neutrons

8. Explain why this guideline matters, with an example of what could go wrong if you ignore it: Do not subtract electrons to calculate neutron count; use mass number minus proton number.

Model explanation: Do not subtract electrons to calculate neutron count; use mass number minus proton number. Example/check: The atomic number Z equals the number of protons. A neutral atom has the same number of electrons; ions differ in electron count.

REFERENCE RELATIONSHIP

mass number A = protons + neutrons; average atomic mass = $\sum(\text{fraction} \times \text{isotope mass})$