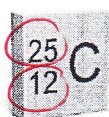


Isotopes

1) What are isotopes?

• versions of atoms that have the same # of protons and diff. # of neutrons

2) Among the elements below, which are isotopes of the same element? Justify your answer.



B-C-G → same #P, diff #n

diff mass #
same atomic #

3) Natural silver is made up of two isotopes in almost equal proportions. Their atomic masses are 107 u and 109 u, respectively. What is the relative atomic mass of silver? Justify your answer.

107 u → 50%

109 u → 50%

mass will be an average of both

108 u

(107.87 on P. table)

4) Boron, which has an atomic mass of 10.81 u, is a mixture of two isotopes, which occur in a ratio of 20 to 80 percent. The mass number of one of these isotopes is 11, the other has a mass number of 10. Which of these two isotopes is the most common? Justify your answer.

B-? = 20%

B-? = 80%

relative \bar{x} = 10.81 u

*↓
closest to 11*

∴ B-11 is most common

5) Neon is an element with the atomic number 10 and a relative atomic mass of 20.28 u.

Neon has three natural isotopes:

neon-20, with a relative atomic mass of approximately 20 u

neon-21, with a relative atomic mass of approximately 21 u

neon-22, with a relative atomic mass of approximately 22 u

Which of these three isotopes is most commonly found in nature? Justify your answer.

rel. atomic mass of Ne = 20.18 u

*↓
closest to 20 u*

∴ Ne-20 is most common in nature

6) The element hydrogen has three isotopes : ${}^1_1\text{H}$, ${}^2_1\text{H}$ and ${}^3_1\text{H}$.

Which of the following statements is **false** ?

- A) The three atoms have the same number of protons. ✓
- B) The three atoms have the same number of electrons. ✓
- C) The three atoms have the same number of neutrons. ✗**
- D) The three atoms have the same chemical properties.

7) Associate each of the following sectors with an advantage or disadvantage connected with the use of radio-isotopes.

| Sector | Advantage or disadvantage |
|----------------|--|
| 1. Environment | a) Isotopes are useful tools in scientific work. 4 |
| 2. Industry | b) Isotopes can contaminate living things and their habitat. 1 |
| 3. Medicine | c) Isotopes are used to detect faults in manufacturing. 2 |
| 4. Research | d) Isotopes are used in the treatment of some illnesses. 3 |

- A) 1a, 2b, 3c and 4d
- B) 1b, 2c, 3d and 4a**
- C) 1d, 2a, 3a and 4b
- D) 1c, 2d, 3b and 4a

8) Which of the following statements is FALSE?

- A) Isotopes have similar chemical properties.
- C) Isotopes have the same number of neutrons.**
- B) Isotopes have the same number of protons.
- D) Isotopes have the same number of electrons.

9) Two isotopes of chlorine are found in nature.

What is the difference between these two isotopes

- A) The number of electrons
- B) The number of protons
- C) The number of neutrons**
- D) The number of electron orbits (energy levels)