

Chapter 1 - Chemical Foundations

1. Consider the element indium, atomic number 49, atomic mass 114.8 g. The nucleus of an atom of indium-112 contains:

- a. 49 protons, 63 neutrons, 49 electrons.
- b. 49 protons, 49 neutrons.
- c. 49 protons, 49 alpha particles.
- d. 49 protons, 63 neutrons.
- e. 49 protons, 112 neutrons.

ANSWER:

d

POINTS:

1

2. A hypothetical element consists of two isotopes of masses 78.95 amu and 80.95 amu with abundances of 32.9% and 67.1%, respectively. What is the average atomic mass of this element?

- a. 79.95 amu
- b. 78.95 amu
- c. 79.6 amu
- d. 80.3 amu
- e. 80.95 amu

ANSWER:

d

POINTS:

1

3. Naturally occurring element X exists in three isotopic forms: X-28 (27.977 amu, 92.23% abundance), X-29 (28.976 amu, 4.67% abundance), and X-30 (29.974 amu, 3.10% abundance). Calculate the atomic weight of X.

- a. 28.09 amu
- b. 48.63 amu
- c. 27.16 amu
- d. 28.97 amu
- e. 86.93 amu

ANSWER:

a

POINTS:

1

4. The atomic mass of rhenium is 186.2. Given that 37.1% of natural rhenium is rhenium-185, what is the other stable isotope?

- a. $^{183}_{75}\text{Re}$
- b. $^{187}_{75}\text{Re}$
- c. $^{189}_{75}\text{Re}$
- d. $^{181}_{75}\text{Re}$
- e. $^{190}_{75}\text{Re}$

ANSWER:

b

POINTS:

1

5. Naturally occurring element X exists in three isotopic forms: X-28 (27.977 amu, 92.23% abundance), X-29

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(28.976 amu, 4.67% abundance), and X-30 (29.974 amu, 3.10% abundance). What is the identity of element X?

- a. Cu
- b. Al
- c. Ni
- d. Si
- e. Sr

ANSWER:

d

POINTS:

1

6. What is the mass of 6 atom(s) of copper in grams?

- a. 381.3 g
- b. 1.58×10^{21} g
- c. 6.38×10^{-24} g
- d. 6.022×10^{23} g
- e. 6.33×10^{-22} g

ANSWER:

e

POINTS:

1

7. You have a sample of zinc (Zn) and a sample of aluminum (Al). You have an equal number of atoms in each sample. Which of the following statements concerning the masses of the samples is true?

- a. The mass of the zinc sample is more than twice as great as the mass of the aluminum sample.
- b. The mass of the zinc sample is more than the mass of the aluminum sample, but it is not twice as great.
- c. The mass of the aluminum sample is more than twice as great as the mass of the zinc sample.
- d. The mass of the aluminum sample is more than the mass of the zinc sample, but it is not twice as great.
- e. The masses of each sample are equal.

ANSWER:

a

POINTS:

1

8. $^{40}_{20}\text{Ca}^{2+}$ has _____.

- a. 20 protons, 20 neutrons, and 18 electrons
- b. 22 protons, 20 neutrons, and 20 electrons
- c. 20 protons, 22 neutrons, and 18 electrons
- d. 22 protons, 18 neutrons, and 18 electrons
- e. 20 protons, 20 neutrons, and 22 electrons

ANSWER:

a

POINTS:

1

9. Which of the following statements is (are) true?

- a. $^{18}_8\text{O}$ and $^{19}_9\text{F}$ have the same number of neutrons.
- b. $^{14}_6\text{C}$ and $^{14}_7\text{N}$ are isotopes of each other because their mass numbers are the same.

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- c. $^{18}_8\text{O}^{2-}$ has the same number of electrons as $^{20}_{10}\text{Ne}$.
- d. A and B
- e. A and C

ANSWER:

POINTS:

e
1

10. A species with 12 protons and 10 electrons is _____.

- a. Ne^{2+}
- b. Ti^{2+}
- c. Mg^{2+}
- d. Mg
- e. Ne^{2-}

ANSWER:

POINTS:

c
1

11. The numbers of protons, neutrons, and electrons in $^{39}_{19}\text{K}^+$ are:

- a. 20 p, 19 n, 19 e.
- b. 20 p, 19 n, 20 e.
- c. 19 p, 20 n, 20 e.
- d. 19 p, 20 n, 19 e.
- e. 19 p, 20 n, 18 e.

ANSWER:

POINTS:

e
1

12. An ion is formed:

- a. by either adding or subtracting protons from the atom.
- b. by either adding or subtracting electrons from the atom.
- c. by either adding or subtracting neutrons from the atom.
- d. all of the above are true.
- e. two of the above are true.

ANSWER:

POINTS:

b
1

13. All of the following are true *except*:

- a. ions are formed by adding electrons to a neutral atom.
- b. ions are formed by changing the number of protons in an atom's nucleus.

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- c. ions are formed by removing electrons from a neutral atom.
- d. an ion has a positive or negative charge.
- e. metals tend to form positive ions.

ANSWER:

b

POINTS:

1

14. The formula of water, H_2O , suggests:

- a. there is twice as much mass of hydrogen as oxygen in each molecule.
- b. there are two hydrogen atoms and one oxygen atom per water molecule.
- c. there is twice as much mass of oxygen as hydrogen in each molecule.
- d. there are two oxygen atoms and one hydrogen atom per water molecule.
- e. none of these.

ANSWER:

b

POINTS:

1

15. NaHCO_3 is the active ingredient in baking soda. How many grams of oxygen are in 0.33 g of NaHCO_3 ?

- a. 0.063 g
- b. 0.012 g
- c. 3.93×10^3 g
- d. 0.021 g
- e. 0.19 g

ANSWER:

e

POINTS:

1

16. Phosphorus has the molecular formula P_4 , and sulfur has the molecular formula S_8 . How many grams of phosphorus contain the same number of molecules as 4.26 g of sulfur?

- a. 2.06 g
- b. 0.486 g
- c. 4.11 g
- d. 4.26 g
- e. none of these

ANSWER:

a

POINTS:

1

17. What is the subscript of barium in the formula of barium phosphate?

- a. 3
- b. 4
- c. 1
- d. 0
- e. 2

ANSWER:

a

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POINTS:

1

18. The _____ in a chemical equation represent the number of atoms in a particular molecule or formula unit.

ANSWER:

subscripts

POINTS:

1