

Chapter 02: Atoms, Molecules, and Ions

A periodic table is required to work many of the problems in this chapter.

1. In a cathode ray tube
 - A) electrons pass from the anode to the cathode.
 - B) electrons pass from the cathode to the anode.
 - C) protons pass from the anode to the cathode.
 - D) protons pass from the cathode to the anode.

3. Which of the following elements is most likely to be a good conductor of electricity?
A) N B) S C) He D) Cl E) Fe

5. The scientist who determined the magnitude of the electric charge of the electron was
 - A) John Dalton.
 - B) Robert Millikan.
 - C) J. J. Thomson.
 - D) Henry Moseley.
 - E) R. Chang.

7. Which of the following scientists developed the nuclear model of the atom?
 - A) John Dalton
 - B) Robert Millikan
 - C) J. J. Thomson
 - D) Henry Moseley
 - E) Ernest Rutherford

9. Atoms of the same element with different mass numbers are called
 - A) ions.
 - B) neutrons.
 - C) allotropes.
 - D) chemical families.
 - E) isotopes.

11. How many protons are there in an atom of uranium whose mass number is 235?
A) 92 B) 143 C) 235 D) 238 E) 327

13. Give the number of protons (p), electrons (e), and neutrons (n) in one atom of nickel-62.
 - A) 28 p, 28 e, 28 n
 - B) 28 p, 28 e, 34 n
 - C) 28 p, 28 e, 62 n
 - D) 62 p, 28 e, 28 n
 - E) 62 p, 62 e, 28 n

15. Which one of the following elements is most likely to form a 2+ ion?
A) beryllium B) carbon C) fluorine D) oxygen E) sodium

17. Two isotopes of an element differ in their
 A) symbol. D) number of protons.
 B) atomic number. E) number of electrons.
 C) atomic mass.
19. An aluminum ion, Al^{3+} , has:
 A) 13 protons and 13 electrons D) 13 protons and 10 electrons
 B) 27 protons and 24 electrons E) 10 protons and 13 electrons
 C) 16 protons and 13 electrons
21. A phosphide ion has:
 A) 10 protons and 13 electrons D) 15 protons and 18 electrons
 B) 12 protons and 15 electrons E) 18 protons and 21 electrons
 C) 15 protons and 15 electrons
23. How many protons and electrons are present in one Br^- ion?
 A) 35 p, 35 e D) 35 p, 36 e
 B) 80 p, 81 e E) 80 p, 34 e
 C) 35 p, 34 e
25. Which pair of elements would be most likely to form an ionic compound?
 A) P and Br B) Zn and K C) F and Al D) C and S E) Al and Rb
27. What is the formula for the ionic compound formed by calcium ions and nitrate ions?
 A) Ca_3N_2 B) $\text{Ca}(\text{NO}_3)_2$ C) Ca_2NO_3 D) Ca_2NO_2 E) CaNO_3
29. What is the formula for the ionic compound formed by magnesium and iodine?
 A) MgI B) Mg_2I C) MgI_2 D) MgI_3 E) Mg_3I
31. Predict the formula for the binary compound formed between barium and phosphorus.
 A) BaP B) Ba_2P C) BaP_2 D) Ba_2P_3 E) Ba_3P_2
33. Which is the correct formula for copper(II) phosphate?
 A) Cu_2PO_4 B) $\text{Cu}_3(\text{PO}_4)_2$ C) Cu_2PO_3 D) $\text{Cu}(\text{PO}_4)_2$ E) $\text{Cu}(\text{PO}_3)_2$

35. The chemical name for ClO_2^- is chlorite ion. Therefore, the name of HClO_2 is
 A) hydrochloric acid. D) chlorous acid.
 B) chloroform. E) chloric acid.
 C) hydrogen dioxychloride.
37. The formula for calcium phosphate is
 A) CaPO_4 . B) $\text{Ca}_3(\text{PO}_4)_2$. C) $\text{Ca}_2(\text{PO}_4)_3$. D) Ca_3P_2 . E)
 $\text{Ca}_3(\text{PO}_3)_2$.
39. The formula for sodium sulfide is
 A) NaS . B) K_2S . C) NaS_2 . D) Na_2S . E) SeS .
41. The correct name for $\text{Ba}(\text{OH})_2$ is
 A) barium hydrogen oxide. D) beryllium hydroxide.
 B) boron hydroxide. E) barium hydroxide.
 C) barium hydrate.
43. The correct name for $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is
 A) copper sulfate acid. D) copper(II) sulfate pentahydrate.
 B) copper sulfate pentahydrate. E) copper(V) sulfate hydrate.
 C) copper(II) sulfate acid.
45. The Stock system name for Mn_2O_7 is
 A) dimanganese heptaoxide. D) manganese(II) oxide.
 B) magnesium oxide. E) manganese(III) oxide.
 C) manganese(VII) oxide.
47. Consistent with vanadium being a transition metal, the name for VSO_4 should be
 A) vanadium sulfide. D) vanadium (II) sulfate.
 B) vanadium (I) sulfite. E) vanadium sulfur tetraoxide.
 C) vanadium (I) sulfate.
49. The chemical formula for iron(II) nitrate is:
 A) $\text{Fe}_2(\text{NO}_3)_3$ B) $\text{Ir}(\text{NO}_2)_2$ C) Fe_2N_3 D) $\text{Fe}(\text{NO}_3)_2$ E) $\text{Fe}(\text{NO}_2)_2$

51. The Stock system name for CrO_3 is:
- A) chromium oxide D) chromium(III) oxide
B) chromium(II) oxide E) chromium(VI) oxide
C) chromium(III) trioxide
53. The mineral pyrolusite is a compound of manganese-55 and oxygen-16. If 63% of the mass of pyrolusite is due to manganese, what is the empirical formula of pyrolusite?
- A) MnO B) Mn_2O C) Mn_2O_2 D) MnO_2 E) none of these
55. The mineral hausmannite is a compound of manganese-55 and oxygen-16. If 72% of the mass of hausmannite is due to manganese, what is the empirical formula of hausmannite?
- A) MnO B) Mn_3O C) Mn_3O_4 D) Mn_4O_3 E) MnO_3
57. The mineral orpiment, having the empirical formula As_2S_3 , was used in ancient times as a cosmetic. What mass of arsenic is present in 5.0 g of orpiment? [Given: naturally occurring arsenic is all arsenic-75; assume that all naturally occurring sulfur is sulfur-32 (only approximately true)]
- A) 0.61 g B) 3.0 g C) 1.5 g D) 2.0 g E) 3.5 g
59. Which of the following elements is chemically similar to oxygen?
- A) sulfur B) calcium C) iron D) nickel E) sodium