TEST BANK

Chemistry

Principles and Reactions

Sixth Edition

Masterton | Hurley

Chapter 2--Atoms, Molecules, and Ions

Student: _____

1. All of the following are postulates of Dalton's atomic theory EXCEPT

   A. in a given compound, relative numbers of atoms of each kind are definite and constant.
   B. elements are composed of atoms.
   C. no atom is changed into another element in an ordinary chemical reaction.
   D. compounds are formed when two or more atoms combine.
   E. atoms are composed of electrons, protons, and neutrons.

2. J.J. Thomson determined that electrons are small, negatively charged particles by

   A. bombarding gold foil with alpha particles.
   B. exposing photographic plates to radioactive uranium.
   C. deflecting cathode rays with electric and magnetic fields.
   D. converting cathode rays to electron particles using a fluorescent screen.
   E. decomposing neutrons into protons and electrons.

3. All of the following statements are true EXCEPT

   A. a proton carries a +1 charge and an electron carries a -1 charge.
   B. the nucleus of an atom has a negative charge.
   C. an alpha particle is a helium atom minus its electrons.
   D. a neutron is an uncharged particle with a mass slightly greater than a proton.
   E. more than 99.9% of an atom's mass is concentrated in the nucleus.

4. Rank the subatomic particles from least to greatest mass.

   A. electrons = neutrons = protons
   B. electrons = protons < neutrons
   C. electrons < neutrons = protons
   D. electrons < protons < neutrons
   E. electrons < neutrons < protons

5. All of the following statements are true EXCEPT

   A. all atoms of a given element have the same mass number.
   B. for any neutral element, the number of electrons is equal to the number of protons.
   C. the mass number is the sum of the number of protons and neutrons.
   D. isotopes of atoms contain the same number of protons but a different number of neutrons.
   E. the atomic number equals the number of protons in an atom.

6. All atoms of the same element have the same number of ____.

A. neutrons
B. protons
C. protons and neutrons
D. electrons and neutrons
E. protons, neutrons, and electrons

7. Which nuclear symbol describes oxygen-15, a radioactive element used in positron emission tomography?

A. $^{15}_{7}\mathrm{O}$

B. $^{16}_{8}\mathrm{O}$

C. $^{15}_{8}\mathrm{O}$

D. $^{16}_{15}\mathrm{O}$

E. $^{15}_{16}\mathrm{O}$

8. Which of the following atoms contains the largest number protons?

A. $^{14}_{6}\mathrm{C}$

B. $^{14}_{7}\mathrm{N}$

C. $^{16}_{8}\mathrm{O}$

D. $^{18}_{8}\mathrm{O}$

E. $^{19}_{9}\mathrm{F}$

9. Which description most accurately describes neptunium-239?

A. mass number = 93, atomic number = 239
B. mass number = 93, number of neutrons = 146
C. mass number = 146, atomic number = 93
D. number of protons = 93, number of neutrons = 146
E. number of protons = 93, atomic number = 239

10. F-20, a radioactive isotope of fluorine, has

A. 9 protons, 10 neutrons, and 1 electron.
B. 9 protons, 10 neutrons, and 9 electrons.
C. 9 protons, 11 neutrons, and 9 electrons.
D. 10 protons, 9 neutrons, and 1 electron.
E. 10 protons, 10 neutrons, and 10 electrons.

11. Which two atoms below have the same number of neutrons?

$^{15}_{8}O$, $^{16}_{8}O$, $^{20}_{9}F$, $^{20}_{10}Ne$, $^{22}_{11}Na$

A. $^{15}_{8}O$ and $^{16}_{8}O$

B. $^{16}_{8}O$ and $^{22}_{11}Na$

C. $^{20}_{9}F$ and $^{20}_{10}Ne$

D. $^{20}_{9}F$ and $^{22}_{11}Na$

E. $^{20}_{10}Ne$ and $^{22}_{11}Na$

12. How many electrons, protons, and neutrons are found in a Cl^- ion formed from Cl-35?

A. 17 electrons, 16 protons, 19 neutrons
B. 17 electrons, 17 protons, 18 neutrons
C. 18 electrons, 18 protons, 18 neutrons
D. 18 electrons, 17 protons, 18 neutrons
E. 18 electrons, 18 protons, 17 neutrons

13. Which two of the ions below have the same number of electrons?

$^{127}_{53}I^-$, $^{119}_{50}Sn^{2+}$, $^{207}_{82}Pb^{2+}$, $^{207}_{82}Pb^{4+}$, $^{137}_{56}Ba^{2+}$

A. $^{127}_{53}I^-$ and $^{137}_{56}Ba^{2+}$

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14. Which of the following nuclei are likely to be unstable and why?

    A. $^{13}_{6}C$. It contains an odd number of neutrons.

    B. $^{2}_{1}H$. The neutron to proton ratio is less than 1.5.

    C. $^{226}_{88}Ra$. All elements with atomic number greater than 83 are radioactive.

    D. Both answers a and c are correct.
    E. All of the above are stable.

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    A. $^{222}_{86}Rn$. All noble gases are unreactive.

    B. $^{15}_{6}C$. The neutron-to-proton ratio is equal to 1.5.

    C. $^{243}_{95}Am$. The neutron to proton ratio is approximately 1.5.

    D. All of the above are stable.
    E. None of the above are stable.

16. Which species has 63 neutrons?

    A. $^{112}_{48}Cd$

    B. $^{112}_{49}In$

    C. $^{63}_{29}Zn$

    D. $^{152}_{63}Eu$

    E. none of the above

17. Two isotopes of chlorine are found in nature, Cl-35 and Cl-37. The average mass of chlorine is 35.45 amu. The more abundant isotope of Cl has

    A. 17 protons, 17 electrons, and 18 neutrons.
    B. 17 protons, 17 electrons, and 18.45 neutrons.
    C. 17 protons, 17 electrons, and 20 neutrons.
    D. 18 protons, 18 electrons, and 17 neutrons.
    E. 19 protons, 19 electrons, and 16 neutrons.

18. What is the identity of $^{55}_{25}X$?

A. zinc
B. silver
C. iridium
D. cesium
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19. What is the nuclear symbol for a species which contains 57 neutrons and has a mass number of 101?

A. Er
B. Ru
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20. Beta (b) particles have identical properties to

A. helium atoms that have been stripped of their electrons.
B. elemental helium.
C. high energy radiation.
D. neutrons.
E. electrons.

21. Gamma (g) rays are

A. helium nuclei with no mass.
B. electrons with no mass.
C. high energy radiation.
D. slow moving neutrons.
E. identical to electrons.

22. How many protons and electrons are in a sulfate ion, SO_4^{2-}?

A. 46 protons and 48 electrons
B. 48 protons and 48 electrons
C. 48 protons and 50 electrons
D. 50 protons and 48 electrons
E. none of the above

23. All of the following groups are considered main group elements EXCEPT

A. group 2.
B. group 7.
C. group 14.
D. group 17.
E. group 18.

24. How many metals are there in group 13?

A. 0
B. 1
C. 2
D. 3
E. 4

25. Identify the halogen from period 4.

A. Br
B. I
C. Kr
D. Ar
E. K

26. Identify the alkali metal from period 5.

A. Rb
B. Ca
C. Sr
D. K
E. Ga

27. Which group of three elements contains a nonmetal, a metal, and a metalloid?

A. Li, Al, Si
B. Na, Hg, I
C. I, Hg, Si
D. K, O, Br
E. H, Al, N

28. Which group of three elements contains an alkaline earth metal, a halogen, and a post-transition element?

A. Be, S, U
B. Ba, As, Ce
C. U, Cl, Rb
D. Mg, Br, Pu
E. K, Ga, Se

29. Which group of three elements contains a transition metal, a halogen, and a noble gas?

A. S, I, Cu
B. Br, Kr, Ba
C. Ar, Hg, Rn
D. Ce, N, He
E. Cu, I, Xe

30. How many elements are contained in period 4?

A. 3
B. 8
C. 10
D. 18
E. 32

31. How many nonmetals, metalloids, and metals are in group 14?

A. 0 nonmetals, 3 metalloids, and 2 metals
B. 1 nonmetal, 2 metalloids, and 2 metals
C. 2 nonmetals, 2 metalloids, and 1 metal
D. 2 nonmetals, 1 metalloid, and 2 metals
E. 3 nonmetals, 0 metalloids, and 2 metals

32. Which two of the following elements are abundant in the Earth's crust, but missing from the human body: O, Al, Si, Fe, C, N?

A. O and Fe
B. Si and C
C. Al and Si
D. O and N
E. Fe and N

33. Which type of formula provides the most information about a compound?

A. covalent
B. empirical
C. molecular
D. polyatomic
E. structural

34. Which particle has 10 electrons?

A. F^-
B. Ne
C. Mg^{2+}
D. answers a and c
E. all of the above

35. What is the charge on a sulfide ion?

A. -2
B. -1
C. 0
D. +1
E. +2

36. A strontium ion has ____ electrons.

A. 35
B. 36
C. 37
D. 38
E. 39

37. Which atom is likely to form a +3 ion?

A. Li
B. C
C. N
D. O
E. Al

38. Identify the ions and their charges in Na_2SO_4.

A. Na^+, SO_4^{2-}
B. Na^+, SO_4^{4-}
C. Na^{2+}, SO_4^{4-}
D. Na^{2+}, SO_4^{2-}
E. Na^{2+}, SO_4^{2-}

39. Identify the ions and their charges in KH_2PO_4.

A. K^+, H^+, P^{3-}, O^{2-}
B. K^+, H^{2+}, P^{3-}, O^{8-}
C. K^+, H_2^{2+}, P^{-1}, O_4^{-2}
D. K^+, $H_2PO_4^-$
E. K^+, H^{2+}, PO_4^{3-}

40. Identify the ions and their charges in Mg_3N_2.

A. Mg^{2+}, N^{3-}
B. Mg^{3+}, N^{2-}
C. Mg^{2+}, N^{3-}
D. Mg^{6+}, N^{6-}
E. Mg_3^{2+}, N_2^{3-}

41. What are the values for x and y, respectively, in $Ca_xH_yPO_4$?

A. 1 and 2
B. 2 and 1
C. 1 and 3
D. 2 and 2
E. 1 and 1

42. What are the values for x and y, respectively, in $Al_x(SO_4)_y$?

A. 1 and 1
B. 1 and 2
C. 1 and 3
D. 2 and 3
E. 3 and 2

43. What is the correct name for Ag_2O?

A. silver(I) oxide
B. silver(I) monoxide
C. silver(II) oxide
D. silver dioxide
E. disilver monoxide

44. What is the correct name for K_3PO_4?

A. tripotassium phosphate
B. potassium(I) monophosphorus tetraoxide
C. potassium(I) phosphate
D. potassium phosphate
E. potassium phosphide

45. What is the correct name for $TiCl_4$?

A. monotitanium tetrachloride
B. tetrachlorine titanate
C. titanium tetrachlorine
D. titanium(IV) tetrachloride
E. titanium(IV) chloride

46. What is the correct formula for aluminum selenide?

A. AlSe
B. $AlSe_2$
C. Al_2Se
D. Al^2Se_3
E. Al_3Se_2

47. What is the correct formula for chromium(III) nitrate?

A. Cr_3NO_3
B. $Cr(NO_3)_3$
C. $Cr_3(NO_3)_3$
D. $Cr^2(NO_3)^3$
E. $Cr_3(NO_3)_2$

48. What is the correct formula for barium perchlorate?

A. $BaClO_4$
B. $BaClO_3$
C. $Ba(ClO_4)_2$
D. $Ba(ClO_3)_2$
E. $Ba(ClO_3)_3$

49. What is the correct name for N_2O_3?

A. nitrogen oxide
B. nitrogen(II) oxide
C. nitrogen(III) oxide
D. trioxygen dinitride
E. dinitrogen trioxide

50. What is the correct name for PF_5?

A. phosphorus pentafluoride
B. phosphorus(V) fluoride
C. phosphorofluoride
D. pentafluorophosphorus
E. pentafluorophosphate

51. What is the correct name for CS_2?

A. carbon sulfur
B. carbon sulfide
C. carbon disulfide
D. carbon(IV) sulfide
E. methane gas

52. What is the correct formula for sulfur dichloride?

A. SCl
B. SCl_2
C. S_2Cl
D. S_2Cl_2
E. S_4Cl_2

53. What is the correct formula for potassium dichromate?

A. $K_2Cr_2O_7$
B. $K_2(Cr_2O_7)_2$
C. K_2CrO_3
D. $K_2(CrO_4)_2$
E. $KCrO_4$

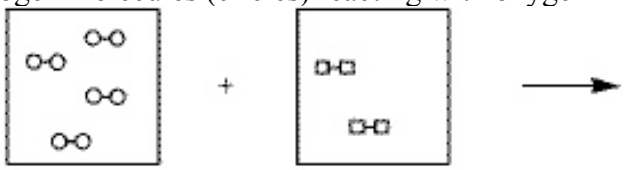
54. What is the formula for chlorous acid?

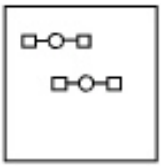
A. HCl
B. HClO
C. $HClO_2$
D. $HClO_3$
E. $HClO_4$

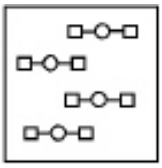
55. What is the correct name for HI(*aq*)?

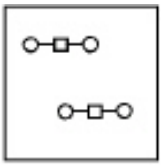
A. hydroiodic acid
B. hydrogen iodide ion
C. monohydrogen monoiodide
D. iodate acid
E. iodine hydride

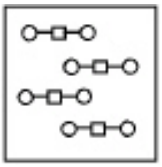
56. Using the laws of constant composition and the conservation of mass, complete the molecular picture of hydrogen molecules (circles) reacting with oxygen molecules (squares) to give water.

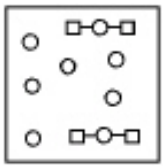


A. 

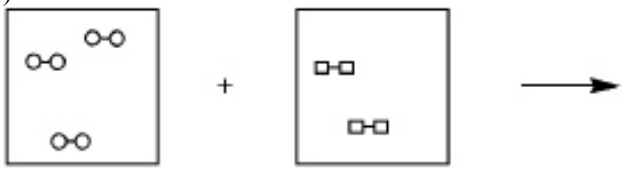
B. 

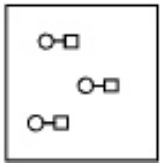
C. 

D. 

E. 

57. Using the laws of constant composition and the conservation of mass, complete the molecular picture of hydrogen molecules (circles) reacting with chlorine molecules (squares) to give hydrogen chloride (HCl).



A. 

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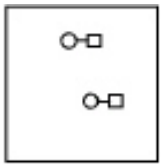
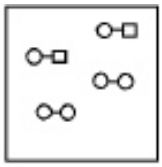
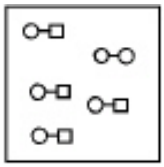
C. 

D. 

E. 

58. What is the correct name for Al_2O_3?

A. aluminum(III) oxide
B. aluminum trioxide
C. aluminum ozinide
D. aluminum oxide
E. dialuminum trioxide

59. BAC stands for:

A. Breath Alcohol Concentration
B. Blood Alcohol Concentration
C. Brain Alcohol Concentration
D. Blood Alcohol Consumption
E. Bad Alcohol Correlation

60. Which of the following is a non-electrolyte?

A. NaCl
B. SF_6
C. KNO_3
D. MgS
E. NH_4Cl

61. Ernest Rutherford's experiment proved that most of the volume of an atom is:

A. filled with protons
B. filled with neutrons
C. filled with electrons
D. filled with alpha particles
E. empty space

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D. 18
E. 32

31. How many nonmetals, metalloids, and metals are in group 14?

A. 0 nonmetals, 3 metalloids, and 2 metals
B. 1 nonmetal, 2 metalloids, and 2 metals
C. 2 nonmetals, 2 metalloids, and 1 metal
D. 2 nonmetals, 1 metalloid, and 2 metals
E. 3 nonmetals, 0 metalloids, and 2 metals

32. Which two of the following elements are abundant in the Earth's crust, but missing from the human body: O, Al, Si, Fe, C, N?

A. O and Fe
B. Si and C
C. Al and Si
D. O and N
E. Fe and N

33. Which type of formula provides the most information about a compound?

A. covalent
B. empirical
C. molecular
D. polyatomic
E. structural

34. Which particle has 10 electrons?

A. F^-
B. Ne
C. Mg^{2+}
D. answers a and c
E. all of the above

35. What is the charge on a sulfide ion?

A. -2
B. -1
C. 0
D. +1
E. +2

36. A strontium ion has ____ electrons.

A. 35
B. 36
C. 37
D. 38
E. 39

37. Which atom is likely to form a +3 ion?

A. Li
B. C
C. N
D. O
E. Al

38. Identify the ions and their charges in Na_2SO_4.

A. Na^+, SO_4^{2-}
B. Na^+, SO_4^{2-}
C. Na^{2+}, SO_4^{4-}
D. Na^{2+}, SO_4^{4-}
E. Na^{-}, SO_4^{2-}

39. Identify the ions and their charges in KH_2PO_4.

A. K^+, H^+, P^{3-}, O^{2-}
B. K^+, H^{2+}, P^{3-}, O^{8-}
C. K^+, H_2^{2+}, P^{-1}, O_4^{-2}
D. K^+, $H_2PO_4^-$
E. K^-, H^{2+}, PO_4^{3-}

40. Identify the ions and their charges in Mg_3N_2.

A. Mg^+_{2+}, N^{3-}
B. Mg_{3+}, N^{3-}
C. Mg^{2+}, N^{2-}
D. Mg_{36+}, N^{26-}
E. Mg_3, N_2

41. What are the values for x and y, respectively, in $Ca_xH_yPO_4$?

A. 1 and 2
B. 2 and 1
C. 1 and 3
D. 2 and 2
E. 1 and 1

42. What are the values for x and y, respectively, in $Al_x(SO_4)_y$?

A. 1 and 1
B. 1 and 2
C. 1 and 3
D. 2 and 3
E. 3 and 2

43. What is the correct name for Ag_2O?

A. silver(I) oxide
B. silver(I) monoxide
C. silver(II) oxide
D. silver dioxide
E. disilver monoxide

44. What is the correct name for K_3PO_4?

A. tripotassium phosphate
B. potassium(I) monophosphorus tetraoxide
C. potassium(I) phosphate
D. potassium phosphate
E. potassium phosphide

45. What is the correct name for $TiCl_4$?

A. monotitanium tetrachloride
B. tetrachlorine titanate
C. titanium tetrachlorine
D. titanium(IV) tetrachloride
E. titanium(IV) chloride

46. What is the correct formula for aluminum selenide?

A. AlSe
B. $AlSe_2$
C. Al_2Se
D. Al_2Se_3
E. Al_3Se_2

47. What is the correct formula for chromium(III) nitrate?

A. Cr_3NO_3
B. $Cr(NO_3)_3$
C. $Cr_2(NO_3)_3$
D. $Cr_2(NO_3)_3$
E. $Cr_3(NO_3)_2$

48. What is the correct formula for barium perchlorate?

A. $BaClO$
B. $BaClO_4$
C. $Ba(ClO_4)_2$
D. $Ba(ClO_3)_2$
E. $Ba(ClO_3)_3$

49. What is the correct name for N_2O_3?

A. nitrogen oxide
B. nitrogen(II) oxide
C. nitrogen(III) oxide
D. trioxygen dinitride
E. dinitrogen trioxide

50. What is the correct name for PF_5?

A. phosphorus pentafluoride
B. phosphorus(V) fluoride
C. phosphorofluoride
D. pentafluorophosphorus
E. pentafluorophosphate

51. What is the correct name for CS_2?

A. carbon sulfur
B. carbon sulfide
C. carbon disulfide
D. carbon(IV) sulfide
E. methane gas

52. What is the correct formula for sulfur dichloride?

A. SCl
B. SCl_2
C. S_2Cl
D. S_2Cl_2
E. S_4Cl_2

53. What is the correct formula for potassium dichromate?

A. $K_2Cr_2O_7$
B. $K_2(Cr_2O_7)_2$
C. K_2CrO_4
D. $K_2(CrO_4)_2$
E. $KCrO_4$

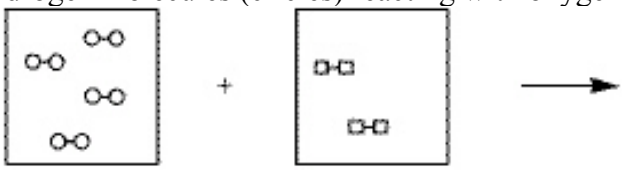
54. What is the formula for chlorous acid?

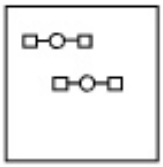
A. HCl
B. HClO
C. $HClO_2$
D. $HClO_3$
E. $HClO_4$

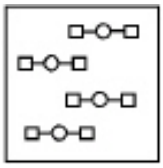
55. What is the correct name for HI(*aq*)?

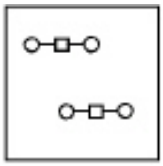
A. hydroiodic acid
B. hydrogen iodide ion
C. monohydrogen monoiodide
D. iodate acid
E. iodine hydride

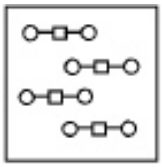
56. Using the laws of constant composition and the conservation of mass, complete the molecular picture of hydrogen molecules (circles) reacting with oxygen molecules (squares) to give water.

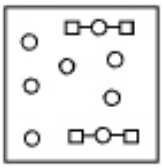


A. 

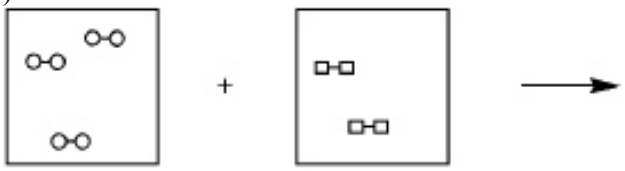
B. 

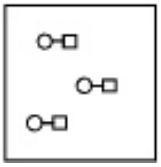
C. 

D. 

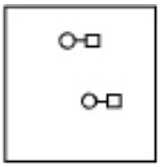
E. 

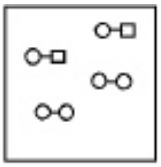
57. Using the laws of constant composition and the conservation of mass, complete the molecular picture of hydrogen molecules (circles) reacting with chlorine molecules (squares) to give hydrogen chloride (HCl).

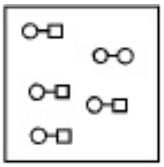


A. 

B. 

C. 

D. 

E. 

58. What is the correct name for Al_2O_3?

A. aluminum(III) oxide
B. aluminum trioxide
C. aluminum ozinide
D. aluminum oxide
E. dialuminum trioxide

59. BAC stands for:

A. Breath Alcohol Concentration
B. Blood Alcohol Concentration
C. Brain Alcohol Concentration
D. Blood Alcohol Consumption
E. Bad Alcohol Correlation

60. Which of the following is a non-electrolyte?

A. NaCl
B. SF_6
C. KNO_3
D. MgS
E. NH_4Cl

61. Ernest Rutherford's experiment proved that most of the volume of an atom is:

A. filled with protons
B. filled with neutrons
C. filled with electrons
D. filled with alpha particles
E. empty space