X0211Smr17 - Chapters 5 - 8

____ 1. A flexible vessel contains 32.00 L of gas at a pressure of 1.59 atm. Under conditions of constant temperature and moles of gas, what is the volume of the gas when the pressure of the vessel is *decreased by a factor of three*?

A) 96.1 L
B) 10.7 L
C) 0.0104 L
D) 32 L
E) 4.80 L

____ 2. A 2.00-L glass soda bottle filled only with air is tightly capped at 24°C and 744.0 mmHg. If the bottle is placed in water at 75°C, what is the pressure in the bottle?

A) 238 mmHg
B) 872 mmHg
C) 2330 mmHg
D) 635 mmHg
E) 383 mmHg

____ 3. A gas occupies a volume of 2.75 L at 350 mmHg and 200°C. Which mathematical expression gives the correct volume at 550 mmHg and 450°C?

A) $2.75\ \text{L} \times \frac{550\ \text{mmHg}}{350\ \text{mmHg}} \times \frac{473\ \text{K}}{723\ \text{K}}$

B) $2.75\ \text{L} \times \frac{350\ \text{mmHg}}{550\ \text{mmHg}} \times \frac{473\ \text{K}}{723\ \text{K}}$

C) $2.75\ \text{L} \times \frac{550\ \text{mmHg}}{350\ \text{mmHg}} \times \frac{723\ \text{K}}{473\ \text{K}}$

D) $2.75\ \text{L} \times \frac{350\ \text{mmHg}}{550\ \text{mmHg}} \times \frac{450°\text{C}}{200°\text{C}}$

E) $2.75\ \text{L} \times \frac{350\ \text{mmHg}}{550\ \text{mmHg}} \times \frac{723\ \text{K}}{473\ \text{K}}$

____ 4. What is the pressure of a 59.6-L gas sample containing 3.01 mol of gas at 44.9°C? (R = 0.0821 L • atm/(K • mol), 1 atm = 760 torr)

A) 1.41×10^{2} mmHg
B) 1.73×10^{-3} mmHg
C) 1.32 mmHg
D) 1.00×10^{3} mmHg
E) 5.77×10^{2} mmHg

____ 5. How many moles of gas are in a gas sample occupying 0.738 L at 135 mmHg and 30°C?

A) 190 mol
B) 4.01 mol
C) 40.5 mol
D) 0.00527 mol
E) 0.000433 mol

____ 6. A mixture consisting of 0.120 mol N_2, 0.018 mol O_2, 0.112 mol CH_4, and an unknown amount of CO_2 occupies a volume of 9.04 L at 25°C and 1.17 atm pressure. How many moles of CO_2 are there in this sample?

A) 0.750 mol
B) 0.182 mol
C) 2.06 mol
D) 4.90 mol
E) 0.432 mol

____ 7. The density of ethane, C_2H_6 (30.1 g/mol), at 32°C and 1.31 atm pressure is

A) 1.57 g/L.
B) 19.2 g/L.
C) 1.34 g/L.
D) 0.635 g/L.
E) 0.162 g/L.

____ 8. A 1.00-L sample of a gas at STP has a mass of 1.16 g. The molar mass of the gas is

A) 5.18 g/mol.
B) 26.0 g/mol.
C) 22.4 g/mol.
D) 44.8 g/mol.
E) 193 g/mol.

____ 9. What is the total volume of gases produced at 819 K and 1.00 atm pressure when 320 g of ammonium nitrite undergoes the following decomposition reaction?

$NH_4NO_2(s) \rightarrow N_2(g) + 2H_2O(g)$

A) 3×22.4 L
B) 22.4 L
C) 15×22.4 L
D) 5×22.4 L
E) 45×22.4 L

____ 10. In which of the following reactions will the pressure increase upon completion of the reaction at constant temperature?

A) $C(s) + O_2(g) \rightarrow CO_2(g)$
B) $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$
C) $C_2H_6O(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$
D) $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$
E) $Cl_2(g) + 3F_2(g) \rightarrow 2ClF_3(g)$

____ 11. Calcium nitrate will react with ammonium chloride at slightly elevated temperatures, as represented in the equation below.

$Ca(NO_3)_2(s) + 2NH_4Cl(s) \rightarrow 2N_2O(g) + CaCl_2(s) + 4H_2O(g)$

What is the maximum volume of N_2O at STP that could be produced using a 3.40-mol sample of each reactant?

A) 9.28×10^2 L
B) 152 L
C) 1.31×10^{-2} L
D) 76.2 L
E) 22.4 L

____ 12. Which of the following is included as a postulate in the kinetic molecular theory of an ideal gas?
A) Collisions between molecules are all elastic.
B) All molecules move randomly in zigzag directions.
C) The distance between gas molecules is small compared with the size of the molecule.
D) All the molecules have the same velocity.
E) In an average collision between molecules, both molecules have the same kinetic energy.

____ 13. Calculate the root-mean-square velocity for the O_2 molecules in a sample of O_2 gas at 24.3°C. (R = 8.3145 J/K·mol)
A) 15.22 m/s
B) 137.6 m/s
C) 277.9 m/s
D) 481.4 m/s
E) 9.167×10^{26} m/s

____ 14. H_2 and F_2 react according to the following equation, forming HF.

$H_2(g) + F_2(g) \rightarrow 2HF(g)$; $\Delta H° = -271$ kJ

If $H_2(g)$ and $F_2(g)$ were mixed in a thermally insulated vessel, the reaction that occurred would be
A) endothermic, and the temperature of the reaction system would fall.
B) We could not tell unless the original and final temperatures were given.
C) exothermic, and the temperature of the reaction system would fall.
D) exothermic, and the temperature of the reaction system would rise.
E) endothermic, and the temperature of the reaction system would rise.

____ 15. Given the thermochemical equation

$2Al(s) + \frac{3}{2}O_2(g) \rightarrow Al_2O_3(s)$; $\Delta H = -1676$ kJ

find ΔH for the following reaction.

$2Al_2O_3(s) \rightarrow 4Al(s) + 3O_2(g)$

A) 838 kJ
B) 1676 kJ
C) –1676 kJ
D) 3352 kJ
E) –838 kJ

____ 16. What is the change in enthalpy at 25°C and 1 atm for the production of 9.00 mol SnO(s)?

$Sn(s) + SnO_2(s) \rightarrow 2SnO(s)$; $\Delta H° = 16.2$ kJ

A) –72.9 kJ
B) –16.2 kJ
C) 16.2 kJ
D) 1.80 kJ
E) 72.9 kJ

____ 17. What is the quantity of heat evolved at constant pressure when 60.3 g $H_2O(l)$ is formed from the combustion of $H_2(g)$ and $O_2(g)$?

$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$; $\Delta H° = -285.8$ kJ

A) 1.17×10^{-2} kJ
B) 285.8 kJ
C) 1.72×10^{4} kJ
D) 85.4 kJ
E) 9.57×10^{2} kJ

____ 18. What quantity, in moles, of hydrogen is consumed when 676.8 kJ of energy is evolved from the combustion of a mixture of $H_2(g)$ and $O_2(g)$?

$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$; $\Delta H° = -285.8$ kJ

A) 2.368 mol
B) 1.184 mol
C) 0.4223 mol
D) 3.368 mol
E) 1.368 mol

____ 19. How much heat is liberated at constant pressure if 0.834 g of calcium carbonate reacts with 48.9 mL of 0.668 *M* hydrochloric acid?

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$; $\Delta H° = -15.2$ kJ

A) –0.127 kJ
B) –0.375 kJ
C) –12.7 kJ
D) –0.248 kJ
E) –10.2 kJ

____ 20. How much heat is evolved upon the complete oxidation of 9.118 g of aluminum at 25°C and 1 atm pressure? (ΔH_f° for Al_2O_3 is –1676 kJ/mol.)

$4Al(s) + 3O_2(g) \rightarrow 2Al_2O_3(s)$

A) 1.528×10^{4} kJ
B) 566.4 kJ
C) 1133 kJ
D) 283.2 kJ
E) 141.6 kJ

____ 21. How much heat is released at constant pressure if 16.9 mL of 0.694 *M* silver nitrate is mixed with 79.7 mL of 0.372 *M* potassium chloride?

$AgNO_3(aq) + KCl(aq) \rightarrow AgCl(s) + KNO_3(aq)$; $\Delta H° = -65.5$ kJ

A) –0.768 kJ
B) –24.4 kJ
C) –1.94 kJ
D) –45.5 kJ
E) –2.71 kJ

____ 22. When 49.4 mL of 0.721 *M* lead(II) nitrate reacts with 99.6 mL of 0.807 *M* sodium chloride, 0.830 kJ of heat is released at constant pressure. What is $\Delta H°$ for this reaction?

$Pb(NO_3)_2(aq) + 2NaCl(aq) \rightarrow PbCl_2(s) + 2NaNO_3(aq)$

A) –23.3 kJ
B) –10.3 kJ
C) –4.23 kJ
D) –7.15 kJ
E) –20.6 kJ

____ 23. How much heat is gained by copper when 51.8 g of copper is warmed from 15.5°C to 76.4°C? The specific heat of copper is 0.385 J/(g • °C).

A) 3.09×10^2 J
B) 29.41 J
C) 23.45 J
D) 1.21×10^3 J
E) 1.52×10^3 J

____ 24. A 170.0-g sample of metal at 79.00°C is added to 170.0 g of $H_2O(l)$ at 14.00°C in an insulated container. The temperature rises to 16.19°C. Neglecting the heat capacity of the container, what is the specific heat of the metal? The specific heat of $H_2O(l)$ is 4.18 J/(g • °C).

A) 4.18 J/(g • °C)
B) 120 J/(g • °C)
C) 0.146 J/(g • °C)
D) –0.146 J/(g • °C)
E) 28.6 J/(g • °C)

____ 25. When 50.0 mL of 1.20 M of HCl(*aq*) is combined with 50.0 mL of 1.30 M of NaOH(*aq*) in a coffee-cup calorimeter, the temperature of the solution increases by 8.01°C. What is the change in enthalpy for this balanced reaction?

$$HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$$

Assume that the solution density is 1.00 g/mL and the specific heat capacity of the solution is 4.18 J/g·°C.

A) –55.8 kJ
B) 55.8 kJ
C) 51.5 kJ

D) –51.5 kJ
E) –26.8 kJ

____ 26. All of the following have a standard enthalpy of formation value of zero at 25°C except
A) C(*s*).
B) Ne(*g*).
C) Fe(*s*).
D) $F_2(g)$.
E) CO(*g*).

____ 27. What is $\Delta H°$ of the following reaction?

$CO_2(g) + 2CH_4(g) \rightarrow C_3H_8(g) + O_2(g)$

Substance	$\Delta H°_f$ (kJ/mol)
$CO_2(g)$	–393.5
$CH_4(g)$	–74.9
$C_3H_8(g)$	–104.7

A) –348.4 kJ
B) –573.1 kJ
C) 438.6 kJ
D) 348.4 kJ
E) –648.0 kJ

____ 28. What is the standard enthalpy change for the following reaction?

$3CH_4(g) + 4O_3(g) \rightarrow 3CO_2(g) + 6H_2O(g)$

Substance	$\Delta H°_f$ (kJ/mol)
$CH_4(g)$	–74.87
$O_3(g)$	+142.7
$CO_2(g)$	–393.5
$H_2O(g)$	–241.8

A) –2285.1 kJ
B) –2977.5 kJ
C) +2977.5 kJ
D) +2285.1 kJ
E) –3426.5 kJ

____ 29. What is the wavelength of a photon having a frequency of 64.6 THz? (1 THz = 10^{15} Hz, $c = 3.00 \times 10^8$ m/s, $h = 6.63 \times 10^{-34}$ J · s)
A) 0.215 nm
B) 4.28×10^{-23} nm
C) 1.28×10^{-14} nm
D) 4.64 nm
E) 4.64×10^{15} nm

____ 30. A light emitting diode (L.E.D.) emits photons with an energy of 3.221×10^{-19} J. What is the energy per mole of photons emitted?

A) 1.939×10^{5} J/mol
B) 5.348×10^{-46} J/mol
C) 1.939×10^{8} J/mol
D) 3.221×10^{-19} J/mol
E) 5.348×10^{-40} J/mol

____ 31. What is the energy of a photon of electromagnetic radiation with a wavelength of 877.4 nm? ($c = 3.00 \times 10^{8}$ m/s, $h = 6.63 \times 10^{-34}$ J · s)

A) 2.27×10^{-19} J
B) 5.82×10^{-40} J
C) 2.27×10^{-28} J
D) 3.42×10^{14} J
E) 1.94×10^{-39} J

____ 32. What is the energy per mole of photons with a wavelength of 976.9 nm? ($c = 3.00 \times 10^{8}$ m/s, $h = 6.63 \times 10^{-34}$ J · s, $N_A = 6.02 \times 10^{23}$ mol^{-1})

A) 2.04×10^{-19} kJ/mol
B) 5.88×10^{14} kJ/mol
C) 1.85×10^{35} kJ/mol
D) 3.07×10^{14} kJ/mol
E) 1.23×10^{2} kJ/mol

____ 33. What is the wavelength of light emitted when the electron in a hydrogen atom undergoes a transition from level $n = 6$ to level $n = 1$? ($c = 3.00 \times 10^{8}$ m/s, $h = 6.63 \times 10^{-34}$ J · s, $R_H = 2.179 \times 10^{-18}$ J)

A) 9.39×10^{-8} m
B) 7.06×10^{-27} m
C) 1.07×10^{7} m
D) 2.12×10^{-18} m
E) 3.20×10^{15} m

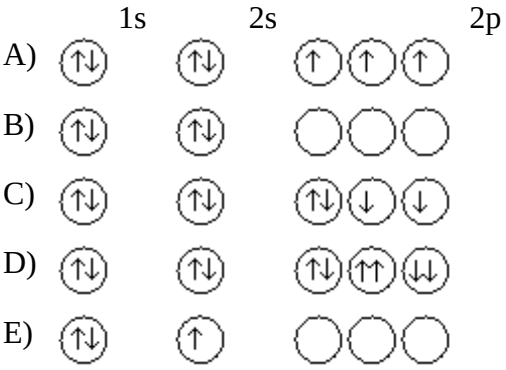
____ 34. Which of the following sets of quantum numbers (n, l, m_l, m_s) refers to a 3d orbital?

A) 2 1 0 $+\frac{1}{2}$
B) 5 4 3 $+\frac{1}{2}$
C) 4 2 1 $-\frac{1}{2}$
D) 4 3 1 $-\frac{1}{2}$
E) 3 2 1 $-\frac{1}{2}$

____ 35. An orbital with the quantum numbers $n = 3, l = 2, m_l = -1$ may be found in which subshell?

A) 3f
B) 3d
C) 3p
D) 3g
E) 3s

____ 36. Which of the following orbital diagrams violates the Pauli exclusion principle?



____ 37. Which of the following electron configurations is impossible, according to the Pauli exclusion principle?
A) $1s^2 2s^2 2p^6$
B) $1s^2 2s^2 2p^3$
C) $1s^2 2s^5$
D) $1s^2 2s^2 2p^6 3s^1$
E) $1s^2 2s^2 2p^1$

____ 38. Which element is found in the s-block of the periodic table?
A) H
B) Rn
C) Mo
D) Pr
E) none of the above

____ 39. According to the building-up principle or aufbau principle, which subshell is typically filled <u>next</u> after the 3d subshell?
A) 4p
B) 5f
C) 6p
D) 5d
E) 1s

____ 40. Which of the following electron configurations corresponds to the ground state of an atom of a transition element?
A) $1s^2 2s^2 2p^5$
B) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^2$
C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$

D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
E) $1s^2 2s^2 2p^6 3s^2 3p^4$

____ 41. The ground-state valence-shell configuration of a particular atom is $5s^2 4d^5$. This valence-shell electron configuration identifies the atom as
A) a transition element.
B) an inner transition element.
C) an s-block main-group element.
D) a p-block main-group element.
E) a noble gas.

____ 42. All of the following ground-state electron configurations are correct <u>except</u>
A) V: $[Ar]4s^2 4d^3$.
B) K: $[Ar]4s^1$.
C) Sn: $[Kr]4d^{10} 5s^2 5p^2$.
D) Cr: $[Ar]3d^5 4s^1$.
E) Te: $[Kr]4d^{10} 5s^2 5p^4$.

____ 43. What is the ground-state electron configuration of tantalum (Ta)?
A) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^6 4d^{10} 4f^{14} 5s^2 5p^3$
B) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^3$
C) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^{14} 5s^2 5p^6 5d^3 6s^2$
D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 5s^2 5p^6 5d^3$
E) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6 4d^{10} 4f^3$

____ 44. Which of the following sets of four quantum numbers (n, l, m_l, m_s) correctly describes an electron occupying a d orbital of an element in the third row of the transition metals?
A) $4 \quad 2 \quad 2 \quad +\frac{1}{2}$
B) $5 \quad 2 \quad 1 \quad -\frac{1}{2}$
C) $5 \quad 3 \quad -1 \quad -\frac{1}{2}$
D) $4 \quad 1 \quad 0 \quad -\frac{1}{2}$
E) $5 \quad 0 \quad 0 \quad -\frac{1}{2}$

____ 45. For an ideal gas, which of the following statements is true?
A) V is inversely proportional to n at constant P and T.
B) P is inversely proportional to T at constant n and V.
C) P is inversely proportional to n at constant V and T.
D) P is inversely proportional to V at constant n and T.
E) V is inversely proportional to T at constant n and P.

____ 46. What is the volume occupied by a mixture of 0.522 mol of N_2 and 0.522 mol of O_2 gases at 0.83 atm and 42.7°C?
A) 9.79×10^2 L
B) 32.6 L
C) 2.20 L

D) 4.41 L
E) 16.3 L

____ 47. In a mixture of argon and hydrogen, occupying a volume of 1.66 L at 910.0 mmHg and 54.9°C, it is found that the total mass of the sample is 1.13 g. What is the partial pressure of argon?
A) 455 mmHg
B) 319 mmHg
C) 866 mmHg
D) 591 mmHg
E) 43.7 mmHg

____ 48. The partial pressures of CH_4, N_2, and O_2 in a sample of gas were found to be 155 mmHg, 476 mmHg, and 669 mmHg, respectively. What is the mole fraction of nitrogen?
A) 20.9
B) 0.880
C) 0.515
D) 0.410
E) 0.366

____ 49. Given that

$O(g) + e^- \rightarrow O^-(g)$; $\Delta H = -142$ kJ
$O(g) + 2e^- \rightarrow O^{2-}(g)$; $\Delta H = 702$ kJ

the enthalpy change for the reaction represented by the equation

$O^-(g) + e^- \rightarrow O^{2-}(g)$ is

A) 0 kJ.
B) –560 kJ.
C) –844 kJ.
D) 844 kJ.
E) 560 kJ.

____ 50. Given the following thermochemical data at 25°C and 1 atm pressure,

$\frac{3}{2}O_2(g) + 2B(s) \rightarrow B_2O_3(s)$; $\Delta H° = -1264$ kJ
$O_3(g) + 2B(s) \rightarrow B_2O_3(s)$; $\Delta H° = -1406$ kJ

determine $\Delta H°$ for the following reaction at 25°C and 1 atm pressure.

$3O_2(g) \rightarrow 2O_3(g)$

A) –980 kJ/mol
B) +284 kJ/mol
C) +980 kJ/mol
D) –2670 kJ/mol
E) –284 kJ/mol

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Answer Section

1. ANS: A PTS: 1 DIF: easy REF: 5.2
   OBJ: Use Boyle's law. (Example 5.2) TOP: phases | gas
2. ANS: B PTS: 1 DIF: easy REF: 5.2
   OBJ: Use Boyle's law. (Example 5.2) TOP: phases | gas
   KEY: empirical gas laws | Boyle's law MSC: general chemistry
3. ANS: E PTS: 1 DIF: moderate REF: 5.2
   OBJ: Use the combined gas law. (Example 5.4) TOP: phases | gas
   KEY: empirical gas laws | combined gas law MSC: general chemistry
4. ANS: D PTS: 1 DIF: easy REF: 5.3
   OBJ: Use the ideal gas law. (Example 5.6) TOP: phases | gas
   KEY: ideal gas law | calculations with the ideal gas law MSC: general chemistry
5. ANS: D PTS: 1 DIF: easy REF: 5.3
   OBJ: Use the ideal gas law. (Example 5.6) TOP: phases | gas
   KEY: ideal gas law | calculations with the ideal gas law MSC: general chemistry
6. ANS: B PTS: 1 DIF: difficult REF: 5.3
   OBJ: Use the ideal gas law. (Example 5.6) TOP: phases | gas
   KEY: ideal gas law | calculations with the ideal gas law MSC: general chemistry
7. ANS: A PTS: 1 DIF: moderate REF: 5.3
   OBJ: Calculate gas density. (Example 5.7) TOP: phases | gas
   KEY: ideal gas law | gas density MSC: general chemistry
8. ANS: B PTS: 1 DIF: easy REF: 5.3
   OBJ: Determine the molecular mass of a vapor. (Example 5.8) TOP: phases | gas
   KEY: ideal gas law | calculations with the ideal gas law MSC: general chemistry
9. ANS: E PTS: 1 DIF: moderate REF: 5.4
   OBJ: Solving stoichiometry problems involving gas volumes. (Example 5.9)
   TOP: phases | gas KEY: ideal gas law | stoichiometry and gas volumes
   MSC: general chemistry
10. ANS: D PTS: 1 DIF: moderate REF: 5.4
    OBJ: Solving stoichiometry problems involving gas volumes. (Example 5.9)
    TOP: phases | gas KEY: ideal gas law | stoichiometry and gas volumes
    MSC: general chemistry
11. ANS: D PTS: 1 DIF: difficult REF: 5.4
    OBJ: Solving stoichiometry problems involving gas volumes. (Example 5.9)
    TOP: phases | gas KEY: ideal gas law | stoichiometry and gas volumes
    MSC: general chemistry
12. ANS: A PTS: 1 DIF: easy REF: 5.6
    OBJ: List the five postulates of the kinetic theory. TOP: phases | gas
    KEY: kinetic theory of an ideal gas | postulates of kinetic theory
    MSC: general chemistry
13. ANS: D PTS: 1 DIF: easy REF: 5.7
    OBJ: Calculate the rms speed of gas molecules. (Example 5.12)
    TOP: phases | gas KEY: molecular speed MSC: general chemistry

14. ANS: D PTS: 1 DIF: easy REF: 6.3
OBJ: Distinguish between an exothermic process and an endothermic process.
TOP: thermochemistry | heats of reaction KEY: enthalpy | enthalpy of reaction
MSC: general chemistry
15. ANS: D PTS: 1 DIF: easy REF: 6.4
OBJ: Manipulate a thermochemical equation using these rules. (Example 6.3)
TOP: thermochemistry | heats of reaction KEY: thermochemical equation | enthalpy of reaction
MSC: general chemistry
16. ANS: E PTS: 1 DIF: easy REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction
KEY: thermochemical equation | stoichiometry and heats of reaction
MSC: general chemistry
17. ANS: E PTS: 1 DIF: easy REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction
KEY: thermochemical equation | stoichiometry and heats of reaction
MSC: general chemistry
18. ANS: A PTS: 1 DIF: easy REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction
19. ANS: A PTS: 1 DIF: moderate REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction
KEY: thermochemical equation | stoichiometry and heats of reaction
MSC: general chemistry
20. ANS: D PTS: 1 DIF: moderate REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction
KEY: thermochemical equation | stoichiometry and heats of reaction
MSC: general chemistry
21. ANS: A PTS: 1 DIF: difficult REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction
KEY: thermochemical equation | stoichiometry and heats of reaction
MSC: general chemistry
22. ANS: A PTS: 1 DIF: difficult REF: 6.5
OBJ: Calculate the heat absorbed or evolved from a reaction given its enthalpy of reaction and the mass of a reactant or product. (Example 6.4)
TOP: thermochemistry | heats of reaction

KEY: thermochemical equation | stoichiometry and heats of reaction
MSC: general chemistry

23. ANS: D PTS: 1 DIF: moderate REF: 6.6
OBJ: Calculate using this relation between heat and specific heat. (Example 6. 5)
TOP: thermochemistry | heats of reaction KEY: calorimetry | measuring heats of reaction
MSC: general chemistry

24. ANS: C PTS: 1 DIF: difficult REF: 6.6
OBJ: Calculate using this relation between heat and specific heat. (Example 6. 5)
TOP: thermochemistry | heats of reaction KEY: calorimetry | specific heat
MSC: general chemistry

25. ANS: A PTS: 1 DIF: moderate REF: 6.6
OBJ: Calculate the enthalpy of reaction from calorimetric data (its temperature change and heat capacity). TOP: thermochemistry | heats of reaction

26. ANS: E PTS: 1 DIF: easy REF: 6.8
OBJ: Define standard state and reference form.
TOP: thermochemistry | heats of reaction KEY: standard enthalpies of formation
MSC: general chemistry

27. ANS: C PTS: 1 DIF: easy REF: 6.8
OBJ: Calculate the heat (enthalpy) of reaction from the standard enthalpies of formation of the substances in the reaction. (Example 6.9) TOP: thermochemistry | heats of reaction
KEY: standard enthalpies of formation MSC: general chemistry

28. ANS: B PTS: 1 DIF: moderate REF: 6.8
OBJ: Calculate the heat (enthalpy) of reaction from the standard enthalpies of formation of the substances in the reaction. (Example 6.9) TOP: thermochemistry | heats of reaction
KEY: standard enthalpies of formation MSC: general chemistry

29. ANS: D PTS: 1 DIF: easy REF: 7.1
OBJ: Relate the wavelength, frequency, and speed of light. (Examples 7.1 and 7.2)
TOP: atomic theory | light KEY: electromagnetic radiation
MSC: general chemistry

30. ANS: A PTS: 1 DIF: moderate REF: 7.2
OBJ: Calculate the energy of a mole of photons from its energy per photon.
TOP: atomic theory | light

31. ANS: A PTS: 1 DIF: easy REF: 7.2
OBJ: Calculate the energy of a photon from its frequency or wavelength. (Example 7.3)
TOP: atomic theory | light
KEY: quantum effects and photons | Planck's quantization of energy
MSC: general chemistry

32. ANS: E PTS: 1 DIF: moderate REF: 7.2
OBJ: Calculate the energy of a photon from its frequency or wavelength. (Example 7.3)
TOP: atomic theory | light
KEY: quantum effects and photons | Planck's quantization of energy
MSC: general chemistry

33. ANS: A PTS: 1 DIF: moderate REF: 7.3
OBJ: Determine the wavelength or frequency of a hydrogen atom transition. (Example 7.4)
TOP: atomic theory | light KEY: Bohr theory | atomic line spectra
MSC: general chemistry

34. ANS: E PTS: 1 DIF: easy REF: 7.5
OBJ: Define each of the quantum numbers for an atomic orbital.
TOP: atomic theory | quantum mechanics KEY: quantum numbers
MSC: general chemistry
35. ANS: B PTS: 1 DIF: easy REF: 7.5
OBJ: State the rules for the allowed values for each quantum number.
TOP: atomic theory | quantum mechanics KEY: quantum numbers
MSC: general chemistry
36. ANS: D PTS: 1 DIF: easy REF: 8.1
OBJ: Apply the Pauli exclusion principle. (Example 8.1)
TOP: atomic theory | electronic structure of atoms
KEY: electron configuration | Pauli exclusion principle MSC: general chemistry
37. ANS: C PTS: 1 DIF: easy REF: 8.1
OBJ: Apply the Pauli exclusion principle. (Example 8.1)
TOP: atomic theory | electronic structure of atoms
KEY: electron configuration | Pauli exclusion principle MSC: general chemistry
38. ANS: A PTS: 1 DIF: easy REF: 8.2
OBJ: Define noble-gas core, pseudo-noble-gas core, and valence electron.
TOP: atomic theory | electronic structure of atoms
39. ANS: A PTS: 1 DIF: easy REF: 8.2
OBJ: Define building-up principle. TOP: atomic theory | electronic structure of atoms
40. ANS: C PTS: 1 DIF: easy REF: 8.2
OBJ: Define main-group element and (d-block and f-block) transition element.
TOP: atomic theory | electronic structure of atoms
KEY: electron configuration and the periodic table MSC: general chemistry
41. ANS: A PTS: 1 DIF: easy REF: 8.2
OBJ: Define main-group element and (d-block and f-block) transition element.
TOP: atomic theory | electronic structure of atoms
42. ANS: A PTS: 1 DIF: moderate REF: 8.3
OBJ: Determine the configuration of an atom using the building-up principle. (Example 8.2)
TOP: atomic theory | electronic structure of atoms
KEY: electron configuration and the periodic table MSC: general chemistry
43. ANS: C PTS: 1 DIF: easy REF: 8.3
OBJ: Determine the configuration of an atom using the building-up principle. (Example 8.2)
TOP: atomic theory | electronic structure of atoms
KEY: electron configuration and the periodic table MSC: general chemistry
44. ANS: B PTS: 1 DIF: easy REF: 8.3
OBJ: Determine the configuration of an atom using the period and group numbers. (Example 8.3)
TOP: atomic theory | electronic structure of atoms
KEY: electron configuration and the periodic table | writing electron configurations using the periodic table MSC: general chemistry
45. ANS: D PTS: 1 DIF: easy REF: 5.3
OBJ: Learn the ideal gas law equation. TOP: phases | gas KEY: ideal gas law
MSC: general chemistry

46. ANS: B PTS: 1 DIF: moderate REF: 5.5
OBJ: Learn the equation for Dalton's law of partial pressures. TOP: phases | gas
KEY: gas mixtures | Dalton's law of partial pressures MSC: general chemistry
47. ANS: B PTS: 1 DIF: difficult REF: 5.5
OBJ: Calculate the partial pressure and mole fractions of a gas in a mixture. (Example 5.10)
TOP: phases | gas KEY: gas mixtures MSC: general chemistry
48. ANS: E PTS: 1 DIF: moderate REF: 5.5
OBJ: Calculate the partial pressure and mole fractions of a gas in a mixture. (Example 5.10)
TOP: phases | gas KEY: gas mixtures | Dalton's law of partial pressures
MSC: general chemistry
49. ANS: D PTS: 1 DIF: moderate REF: 6.7
OBJ: Apply Hess's law to obtain the enthalpy change for one reaction from the enthalpy changes of a number of other reactions. (Example 6.7)
TOP: thermochemistry | heats of reaction KEY: Hess's law MSC: general chemistry
50. ANS: B PTS: 1 DIF: moderate REF: 6.7
OBJ: Apply Hess's law to obtain the enthalpy change for one reaction from the enthalpy changes of a number of other reactions. (Example 6.7)
TOP: thermochemistry | heats of reaction KEY: Hess's law MSC: general chemistry