Ch.11-Q2W5- Qs. Bank-Behavior of gases

True/False
Indicate whether the statement is true or false.

____ 1. According to Charles's law, the volume of a gas is inversely proportional to its pressure at constant temperature.

____ 2. A weather balloon functions on the principle of Gay-Lussac's law.

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 3. A steel tank with a volume of 9.583 L contains N_2 gas under a pressure of 4.972 atm at 31.8 °C. Calculate the number of moles of N_2 in the tank.
a. 0.002 mol
b. 0.018 mol
c. 0.525 mol
d. 1.90 mol

____ 4. Four liters of gas at atmospheric pressure is compressed into a 0.85 L gas cylinder. What is the pressure of the compressed gas if its temperature remains constant?
a. 0.15 atm
b. 0.21 atm
c. 3.4 atm
d. 4.7 atm

____ 5. When a bicycle reaches the top of a hill with a tire volume of 0.80 L, the atmospheric pressure is 9.0 atm. What is the maximum volume of air that can be filled in the tire just before it bursts?
a. 0.088 L
b. 1.2 L
c. 8.9 L
d. 11 L

____ 6. When a milkshake is taken in through a straw at a pressure of 0.071 atm, the straw contains 5.0 mL of liquid. How much liquid is consumed at 0.092 atm?
a. 0.10 mL
b. 3.9 mL
c. 6.3 mL
d. 7.8 mL

____ 7. In a hospital, oxygen is administered to patients at 3.0 atm in a hyperbaric oxygen chamber. Oxygen gas, measuring 600.0 L, is compressed in a cylinder at 160.0 atm. What volume of oxygen can a cylinder supply at the given pressure?
a. 11 L
b. 32 L
c. 11×10^3 L
d. 32×10^3 L

____ 8. A 2.50 L balloon is filled with water at 2.27 atm. If the balloon is squeezed into a 0.80 L beaker and does NOT burst, what is the pressure of water in the balloon?
a. 0.72 atm
b. 0.88 atm
c. 7.1 atm
d. 8.8 atm

____ 9. A balloon is filled with 3.50 L of water at 24.0°C and 2.27 atm. If the balloon is placed outdoors on a hot day at a temperature of 34.0°C, what is the volume of the balloon at constant pressure?
a. 2.47 L
b. 3.38 L
c. 3.61 L
d. 8.19 L

____ 10. The volume of a sample of helium is 4.50 mL at 20.0°C and 203.0 kPa. What will its volume be at 10.0°C and 203.0 kPa?
a. 2.25 mL
b. 3.78 mL
c. 4.34 mL
d. 6.85 mL

____ 11. The volume of a 24.0-g sample of methane gas is 22.8 L at 40.0°C and 4.00 atm. What will its volume be at 68.0°C and 4.00 atm?

a. 20.9 L
b. 24.8 L
c. 38.7 L
d. 40.8 L

____ 12. A 40.0-L sample of fluorine is heated from 90.0°C to 186.0°C. What volume will the sample occupy at the higher temperature?
a. 19.3 L
b. 31.6 L
c. 50.5 L
d. 82.6 L

____ 13. A welding torch requires 3200 L of ethylene gas at 3.00 atm. What will be the pressure of the gas if ethylene is supplied by a 250.0-L tank?
a. 0.231 atm
b. 2.34 atm
c. 38.4 atm
d. 45.4 atm

____ 14. The volume of a gas is 1.50 L at 30.0°C and 1.00 atm. What volume will the gas occupy if the temperature is raised to 134.0°C at constant pressure?
a. 0.331 L
b. 1.11 L
c. 2.01 L
d. 6.70 L

____ 15. How many moles of helium gas are contained in a 4.0-L flask at STP?
a. 0.045 mol
b. 0.089 mol
c. 0.17 mol
d. 89 mol

Completion

Complete each statement.

16. A mixture consists of three gases, A, B, and C. The partial pressure of A is 5.1 Pa, of B is 1.5 Pa, and of C is 1.2 Pa. The total pressure of the mixture is _____ Pa.

17. The SI unit for measuring pressure is the _____.

18. _____ states that equal volumes of gases at the same pressure and temperature contain equal numbers of particles.

19. The _____ is equivalent to 1000 pascals.

20. The term _____ refers to a temperature of 0ºC and a pressure of 1 atm.

21. An instrument used to measure atmospheric pressure is the _____.

22. A method used to convert measurements in one unit to their equivalent in a second unit is called the _____.

23. The statement defining the relationship between the temperature and volume of a gas at constant pressure is known as _____.

24. The pressure needed to support a 760 mm column of mercury is known as one _____.

25. The relationship between the pressure and volume of a sample of gas at constant temperature is a(n) _____ proportion.

Matching

Match each item with the correct statement below.

a. barometer
b. Robert Boyle
c. kilopascal
d. 14.7 psi
h. Blaise Pascal
i. sphygmomanometer
j. atmospheric pressure
k. pound per square inch

e. 101.3 kPa
f. Jacques Charles
g. inverse
l. small whole number ratios
m. Evangelista Torricelli

____ 26. The device used to measure blood pressure.
____ 27. The device used to measure atmospheric pressure.
____ 28. Invented the barometer.
____ 29. Less at the top of a mountain than at the bottom of the mountain.
____ 30. A commonly used multiple of the unit pascal.
____ 31. The unit of pressure in the old system of measurement in the United States.
____ 32. Normal air pressure.
____ 33. Normal air pressure measured in kilopascals.
____ 34. Gas volume and gas pressure have this relationship.
____ 35. Discovered the relationship between gas volume and temperature.

Short Answer

36. State Avogadro's principle.

37. Water vapor and air inside an aluminum container are heated to a high temperature. The container is then submerged in ice-cold water. Why does the aluminum container collapse?

38. Define the law that describes the partial pressures of gases present in a mixture.

39. What pressure would a gas exert at absolute zero? Explain.

40. A barometer is carried to the bottom of a mine shaft, 1000 m beneath Earth's surface. What can you say about the level of mercury in the barometer?

41. Explain why pumping additional air into a tire causes the pressure inside the tire to increase. Discuss the motion of air molecules in your answer.

42. What is in the top of the tube above the mercury column in a barometer?

43. A weather balloon on Earth's surface looks as if it is almost empty and barely inflated. As it floats upward, it becomes increasingly larger and at some point becomes fully inflated. How do you explain this process?

44. Use Table 11.1 on page 379 in your textbook and the equation 1.00 in. = 25.4 mm to convert the following pressure measurements: 10.8 psi to mm Hg, 405 kPa to psi, 983 mm Hg to kPa, and 36.50 atm to in. Hg.

45. A cylinder contains 32 g of air. If 48 g of air are pumped into the cylinder at constant temperature, how does the pressure in the cylinder change?

46. A cylinder contains 41.2 g of neon gas at a pressure of 16.40 atm. The valve is opened and gas is allowed to escape until the pressure is reduced to 9.15 atm at constant temperature. How many grams of neon escaped?

47. If the gas pressure in an aerosol can is 166 kPa at 17ºC, what is the pressure inside the can if it is heated to 195ºC?

48. A tank for compressed gas can safely withstand a maximum pressure of 825 kPa. The pressure in the tank is 645 kPa at a temperature of 25ºC. What is the highest temperature the tank can safely withstand?

49. A cylinder of compressed gas has a volume of 3.85 L and a pressure of 463 kPa. What volume would the gas occupy if it were allowed to escape into a balloon at a pressure of 110 kPa? Assume constant temperature.

50. A sample of carbon dioxide gas is compressed, causing its pressure to increase by 33 percent at constant temperature. What is the percentage change in the volume of the sample?

51. The volume of a sample of argon gas is 138 mL at -150ºC and 1 atm. Predict the volume of the sample at +150ºC and 1 atm.

52. A cylinder contains 6.94 L of a gas at a temperature of 15ºC. The cylinder is heated, and a piston moves in the cylinder so that constant pressure is maintained. If the final volume of the gas in the cylinder is 8.50 L, what is the final temperature?

53. A 2.16-L sample of oxygen is collected at 99.6 kPa and 305 K. If the pressure increases to 122.8 kPa and the temperature drops to 285 K, what volume will the oxygen occupy?

54. At 525 mm Hg and 85ºC, the volume of a sample of nitrogen gas is 26.8 L. What is the volume at STP?

55. A 42-g sample of krypton gas has a volume of 11.2 L at STP. The sample is heated to 112ºC and compressed to a volume of 6.83 L. What is the resulting pressure?

Problem

56. Calculate the temperature of 2.0 moles of a gas occupying a volume of 5.0 L at 2.46 atm.

57. A 6.32-L football is filled with air at 1.90 atm at 25.1°C. At the same temperature, the volume of the football is reduced to 3.49 L. What is the pressure of air in the ball?

58. A gas is confined in a cylinder fitted with a movable piston. At 20.5°C, the gas occupies a volume of 7.90 L under a pressure of 3.36 atm. The gas is isothermally compressed until its pressure reaches 6.24 atm. What volume does the compressed gas occupy?

59. The volume of a 28.70-g sample of carbon dioxide gas is 26.42 L at 73.0°C and 12.00 atm. What will its volume be at 92.0°C and 12.00 atm?

60. How many grams of gas are present in a sample that has a molar mass of 75.0 g/mol and occupies a 3.00-L container at 100.0 kPa and 35.0°C?

61. If the pressure exerted by a gas at 27.0°C in a vessel of volume 0.050 L is 4.00 atm, how many moles of the gas are present?

62. Calculate the volume of the vessel that holds 0.30 moles of a gas at STP.

63. Hydrogen chloride and argon form a mixture at room temperature. The partial pressure of hydrogen chloride is 1.2 atm and that of argon is 2.7 atm. What is the total pressure of the mixture of the two gases?

64. A mixture of helium and krypton are formed at room temperature. If the total pressure of the mixture is 1.7 atm and the partial pressure of helium is 1.6 atm, what is the pressure of krypton?

65. Natural gas is often stored in large tanks kept under constant pressure by a dome that rides up and down on vertical tracks. Suppose the volume of gas in a municipal tank measures 2.50×10^6 m^3 during the evening when the temperature is 15ºC. What will be the volume of the gas in the tank during the day when the temperature rises to 27ºC?

66. At 20ºC, a sample of nitrogen gas occupies 25.0 L. What volume will the nitrogen occupy at 225ºC?

67. Carbon dioxide gas is stored in a steel container with a volume of 12.5 L under a pressure of 50.0 atm. What volume will the gas occupy when it is released from the container into a pressure of 1.00 atm?

68. A refrigeration system contains 575 mL of a gas at 22ºC and 1.25 atm. The gas is compressed until it has a pressure of 2.00 atm and a temperature of -6ºC. What is the new volume of the gas in the system?

69. The reading on a barometer is 764 mm Hg. If the barometer contained water instead of mercury, would you expect the reading to be more than, less than, or equal to 764 mm? Explain. Consider the densities of mercury and water.

70. A pair of chemistry students worked together in the laboratory to collect data on the volumes, pressures, and temperatures of several samples of gases. One student worked on Tuesday and the other on Wednesday. Each student neglected to collect certain data from time to time. From the data reported in the table, calculate the missing information indicated by the numbers **(1)** through **(5)**.

	Tuesday Data			**Wednesday Data**		
Trial	**Volume**	**Pressure**	**Temp.**	**Volume**	**Pressure**	**Temp.**
101	125 mL	1.00 atm	25ºC	**1.** _____	1.00 atm	0.0ºC
102	25.0 mL	650 mm Hg	22.5ºC	30.0 mL	**2.** _____	22.5ºC
103	39.0 mL	1.025 atm	0.0ºC	35.0 mL	1.025 atm	**3.** ____
104	250.0 mL	750 mm Hg	32ºC	**4.** _____	780 mm Hg	47ºC
105	**5**. _____	25 mm Hg	-45ºC	0.079 L	760 mm Hg	0.0ºC

Ch.11-Q2W5- Qs. Bank-Behavior of gases
Answer Section

TRUE/FALSE

1. ANS: F
   According to Charles's law, the volume of a gas is directly proportional to its Kelvin temperature at constant pressure.

   PTS: 1 DIF: 1 REF: Page 392
   OBJ: 11.2.2 Model Boyle's law, Charles's law using kinetic theory.
   TOP: Model Boyle's law, Charles's law using kinetic theory. KEY: Charles's law
   MSC: 1
   NOT: /T/ According to Boyle's law, the volume of a gas is inversely proportional to its pressure at constant temperature. /F/ Correct!
2. ANS: F
   As temperature is constant in a weather balloon, a weather balloon functions on the principle of Boyle's law.

   PTS: 1 DIF: 2 REF: Page 394
   OBJ: 11.2.3 Predict the effect of changes in pressure and temperature on the volume of a gas.
   TOP: Predict the effect of changes in pressure and temperature on the volume of a gas.
   KEY: Boyle's law MSC: 2
   NOT: /T/ A weather balloon functions on the principle of Boyle's law. If the volume of a given amount of gas held at constant temperature increases, the pressure decreases. /F/ Correct!

MULTIPLE CHOICE

3. ANS: D
   According to the ideal gas law, $PV = n\mathrm{R}T$.

	Feedback
A	Use the correct numerical value of R. The value of R is not 62.4.
B	Use the correct numerical value of R. The value of R is not 8.314.
C	Divide PV by RT to obtain the number of moles of N2.
D	Correct!

   PTS: 1 DIF: 2 REF: Page 395
   OBJ: 11.2.3 Predict the effect of changes in pressure and temperature on the volume of a gas.
   TOP: Predict the effect of changes in pressure and temperature on the volume of a gas.
   KEY: Applying the ideal gas law MSC: 3
4. ANS: D
   Using Boyle's law, $P_1V_1 = P_2V_2$.

	Feedback
A	Divide V1 by V2.
B	Multiply the volume by the atmospheric pressure.
C	The value of V1 is 4.0 L, and not 0.85 L.
D	Correct!

PTS: 1 DIF: 1 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3

5. ANS: A
Using Boyle's law, $P_1V_1 = P_2V_2$.

	Feedback
A	Correct!
B	Calculate the pressure in 1.00 atm, not in 14.70 psi.
C	Use the atmospheric pressure in atm, not in kPa.
D	The values of P2 is 9.00 atm.

PTS: 1 DIF: 1 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3

6. ANS: B
Using Boyle's law, $P_1V_1 = P_2V_2$.

	Feedback
A	The value of P1 in Boyle's law is 0.072 atm.
B	Correct!
C	The product of P1 and V1 in Boyle's law is incorrect.
D	In Boyle's law, divide P1V1 by 0.092 atm.

PTS: 1 DIF: 1 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3

7. ANS: D
Using Boyle's law, $P_1V_1 = P_2V_2$.

	Feedback
A	If V1 is 600 L, then the value of P1 is 160.0 atm.
B	Divide P1V1 by 3.0 atm.
C	The volume is expressed in liters, so do not multiply it by 1000.
D	Correct!

PTS: 1 DIF: 1 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3

8. ANS: C
Using Boyle's law, $P_1V_1 = P_2V_2$.

	Feedback
A	The value of V1 is 2.5 L when P1 is 2.27 atm.
B	Divide P1V1 by 0.8.

C	Correct!
D	The value of V2 is 0.8 L.

PTS: 1 DIF: 1 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3

9. ANS: C

Using Charles's law, $\frac{V_1}{T_1} = \frac{V_2}{T_2}$.

	Feedback
A	First, convert the temperature to Kelvin. Then, use Charles's law.
B	The value of T2 in Charles's law is 307, and not 297.
C	Correct!
D	The pressure is constant, so do not include 2.27 atm in the calculation.

PTS: 1 DIF: 3 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Charles's law MSC: 3

10. ANS: C

Using Charles's law, $\frac{V_1}{T_1} = \frac{V_2}{T_2}$.

	Feedback
A	First, convert the temperature to Kelvin. Then, use Charles's law.
B	The value of T2 is 283, and not 293.
C	Correct!
D	The pressure is constant, so do not include 203 kPa in the calculation.

PTS: 1 DIF: 3 REF: Page 392
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Charles's law MSC: 3

11. ANS: B

Using Charles's law, $\frac{V_1}{T_1} = \frac{V_2}{T_2}$.

	Feedback
A	The value of T2 is 341, and not 313.
B	Correct!
C	First, convert the temperature to Kelvin. Then, use Charles's law.
D	The pressure is constant, so do not include 4 atm in the calculation.

PTS: 1 DIF: 3 REF: Page 392
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.

TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Charles's law MSC: 3

12. ANS: C

Using Charles's law, $\frac{V_1}{T_1} = \frac{V_2}{T_2}$.

	Feedback
A	First, convert the temperature to Kelvin. Then, use Charles's law. Also, the value of T1, in Kelvin, is 459 and not 363.
B	The value of T2 is 363 and not 459.
C	Correct!
D	First, convert the temperature to Kelvin. Then, calculate the volume using Charles's law.

PTS: 1 DIF: 2 REF: Page 392
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Charles's law MSC: 3

13. ANS: C

Using Boyle's law, $P_1V_1 = P_2V_2$.

	Feedback
A	The value of V1 is 3200 L when P1 is 3 atm.
B	Divide P1V1 by 250 L.
C	Correct!
D	The value of V2 is 250 L.

PTS: 1 DIF: 1 REF: Page 382 | Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3

14. ANS: C

Using Charles's law, $\frac{V_1}{T_1} = \frac{V_2}{T_2}$.

	Feedback
A	First, convert the temperature to Kelvin. Then, use Charles's law. Also, the value of T1, in Kelvin, is 303, and not 407.
B	The value of T2 is 407, and not 303.
C	Correct!
D	First, convert the temperature to Kelvin. Then, use Charles's law.

PTS: 1 DIF: 2 REF: Page 392
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Charles's law MSC: 3

15. ANS: C

Avogadro's principle states that equal volumes of gases at the same temperature and pressure contain equal numbers of particles.

	Feedback
A	Divide 4 by 22.4 to find the number of moles.
B	Divide the volume and not the atomic number of helium by 22.4.
C	Correct!
D	Divide the volume by 22.4 instead of finding the product of 22.4 and 4.

PTS: 1 DIF: 1 REF: Page 398
OBJ: 11.2.4 Relate how volumes of gases react in terms of the kinetic theory of gases.
TOP: Relate how volumes of gases react in terms of the kinetic theory of gases.
KEY: Avogadro's principle MSC: 3

COMPLETION

16. ANS: 7.8

PTS: 1 DIF: 1 REF: Page 379
OBJ: 11.1.3 Demonstrate the ability to use the factor label method to convert pressure units.
TOP: Explain how gas pressure is measured and calculate the partial pressure of a gas.
KEY: Partial pressure MSC: 2

17. ANS:
pascal
Pa

PTS: 1 DIF: B OBJ: 11-3

18. ANS: Avogadro's principle

PTS: 1 DIF: B OBJ: 11-7

19. ANS: kilopascal

PTS: 1 DIF: B OBJ: 11-3

20. ANS: standard temperature and pressure

PTS: 1 DIF: B OBJ: 11-6

21. ANS: barometer

PTS: 1 DIF: B OBJ: 11-2

22. ANS: factor-label method

PTS: 1 DIF: B OBJ: 11-3

23. ANS: Charles's law

PTS: 1 DIF: B OBJ: 11-5

24. ANS:
standard atmosphere
atm

PTS: 1 DIF: B OBJ: 11-2

25. ANS: inverse

PTS: 1 DIF: B OBJ: 11-6

MATCHING

26. ANS: I PTS: 1 DIF: B OBJ: 11-2
27. ANS: A PTS: 1 DIF: B OBJ: 11-2
28. ANS: M PTS: 1 DIF: B OBJ: 11-2
29. ANS: J PTS: 1 DIF: B OBJ: 11-2
30. ANS: C PTS: 1 DIF: B OBJ: 11-2
31. ANS: K PTS: 1 DIF: B OBJ: 11-2
32. ANS: D PTS: 1 DIF: B OBJ: 11-2
33. ANS: E PTS: 1 DIF: B OBJ: 11-2
34. ANS: G PTS: 1 DIF: B OBJ: 11-5
35. ANS: F PTS: 1 DIF: B OBJ: 11-5

SHORT ANSWER

36. ANS:
Avogadro’s principle states that the volume of a gas is directly proportional to the number of moles at constant temperature and volume.

PTS: 1 DIF: 1 REF: Page 398
OBJ: 11.2.4 Relate how volumes of gases react in terms of the kinetic theory of gases.
TOP: Relate how volumes of gases react in terms of the kinetic theory of gases.
KEY: Avogadro's principle MSC: 1

37. ANS:
When water vapor and air inside the aluminum container are heated to a high temperature, the molecules of gases exert pressure on the sides of the container, but the gases condense when cooled by the ice-cold water and exert less pressure. Since the container is submerged under water, no new air can equalize the pressure, and the container collapses.

PTS: 1 DIF: 3 REF: Page 394 | Page 395
OBJ: 11.2.3 Predict the effect of changes in pressure and temperature on the volume of a gas.
TOP: Predict the effect of changes in pressure and temperature on the volume of a gas.
KEY: Pressure MSC: 2

38. ANS:
Dalton’s law of partial pressures describes partial pressures of gases present in a mixture. According to this law, the total pressure of a mixture of gases is equal to the sum of the partial pressures of all the gases present in the mixture.

PTS: 1 DIF: 1 REF: Page 379
OBJ: 11.1.3 Demonstrate the ability to use the factor label method to convert pressure units.
TOP: Demonstrate the ability to use the factor label method to convert pressure units.
KEY: Dalton's law MSC: 1

39. ANS:
The gas would exert no pressure because at absolute zero its molecules would have no motion.

PTS: 1 DIF: B OBJ: 11-7

40. ANS:
Air pressure at this depth will be greater than at Earth's surface, so the barometer reading will be higher than at the surface.

PTS: 1 DIF: B OBJ: 11-2

41. ANS:
A tire is tough and does not expand easily. The additional air causes the rate of collision of molecules with the inner wall of the tire to increase, thus increasing the pressure inside the tire.

PTS: 1 DIF: B OBJ: 11-6

42. ANS:
a vacuum

PTS: 1 DIF: B OBJ: 11-2

43. ANS:
As the balloon ascends, the atmospheric pressure on the balloon decreases. Then the gas in the balloon expands as the pressure inside the balloon remains equal to the atmospheric pressure.

PTS: 1 DIF: B OBJ: 11-6

44. ANS:
558 mm Hg, 58.8 psi, 131 kPa, and 1092 in. Hg

PTS: 1 DIF: B OBJ: 11-3

45. ANS:
The new pressure is 2.5 times the old pressure.

PTS: 1 DIF: B OBJ: 11-1

46. ANS:
18.2 g escaped

PTS: 1 DIF: B OBJ: 11-1

47. ANS:
268 kPa

PTS: 1 DIF: B OBJ: 11-1

48. ANS:
108ºC

PTS: 1 DIF: B OBJ: 11-1

49. ANS:
16.2 L

PTS: 1 DIF: B OBJ: 11-6

50. ANS:
The volume decreases by 25 percent.

PTS: 1 DIF: B OBJ: 11-6

51. ANS:
475 mL

PTS: 1 DIF: B OBJ: 11-6

52. ANS:
80ºC

PTS: 1 DIF: B OBJ: 11-6

53. ANS:
1.64 L

PTS: 1 DIF: B OBJ: 11-6

54. ANS:
1 L

PTS: 1 DIF: B OBJ: 11-6

55. ANS:
2.31 atm

PTS: 1 DIF: B OBJ: 11-6

PROBLEM

56. ANS:
75 K
–198°C

PTS: 1 DIF: 2 REF: Page 395
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Ideal gas law MSC: 3
NOT: According to the ideal gas law equation, PV = nRT.

57. ANS:
3.45 atm

PTS: 1 DIF: 1 REF: Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3
NOT: Since the gas is isothermally heated, determine the pressure of the gas by using Boyle's law. The Boyle's law equation is P2 = P1*(V1/V2).

58. ANS:
4.25 L

PTS: 1 DIF: 1 REF: Page 383
OBJ: 11.2.1 Analyze data that relate temperature, pressure, and volume of a gas.
TOP: Analyze data that relate temperature, pressure, and volume of a gas.
KEY: Boyle's law MSC: 3
NOT: Determine the volume of the gas by using Boyle's law. The Boyle's law equation is V2 = V1*(P1/P2).

59. ANS:
27.9 L

PTS: 1 DIF: 2 REF: Page 392
OBJ: 11.2.2 Model Boyle's law, Charles's law using kinetic theory.
TOP: Model Boyle's law, Charles's law using kinetic theory. KEY: Charles's law
MSC: 3
NOT: Determine the volume of the gas by using Charles's law. The Charles's law equation is V2 = V1*(T2/T1).

60. ANS:
8.79 g

PTS: 1 DIF: 3 REF: Page 396
OBJ: 11.2.3 Predict the effect of changes in pressure and temperature on the volume of a gas.
TOP: Predict the effect of changes in pressure and temperature on the volume of a gas.
KEY: The ideal gas law - using molar mass MSC: 3
NOT: The molar mass of gas is determined using the ideal gas law equation, PV = mRT/M.

61. ANS:
15 mol

PTS: 1 DIF: 3 REF: Page 395
OBJ: 11.2.3 Predict the effect of changes in pressure and temperature on the volume of a gas.
TOP: Predict the effect of changes in pressure and temperature on the volume of a gas.
KEY: The ideal gas law - using moles MSC: 3
NOT: The number of moles of a gas is determined using the ideal gas law equation. The ideal gas law equation is n = PV/RT.

62. ANS:
6.7 L

PTS: 1 DIF: 2 REF: Page 395
OBJ: 11.2.4 Relate how volumes of gases react in terms of the kinetic theory of gases.
TOP: Relate how volumes of gases react in terms of the kinetic theory of gases.
KEY: Avogadro's principle MSC: 3
NOT: The volume is calculated using Avogadro's principle.

63. ANS:
3.9 atm

PTS: 1 DIF: 1 REF: Page 379
OBJ: 11.1.3 Demonstrate the ability to use the factor label method to convert pressure units.
TOP: Demonstrate the ability to use the factor label method to convert pressure units.
KEY: Dalton's law MSC: 3
NOT: The total pressure is the sum of the partial pressures of the two gases.

64. ANS:
0.1 atm

PTS: 1 DIF: 1 REF: Page 379
OBJ: 11.1.3 Demonstrate the ability to use the factor label method to convert pressure units.
TOP: Demonstrate the ability to use the factor label method to convert pressure units.
KEY: Dalton's law MSC: 3
NOT: The total pressure is the sum of the partial pressures of the two gases.

65. ANS:
The volume of the gas will be 2.60×10^6 m^3.

PTS: 1 DIF: B OBJ: 11-4

66. ANS:
42.5 L

PTS: 1 DIF: B OBJ: 11-4

67. ANS:
The volume will be 625 L.

PTS: 1 DIF: B OBJ: 11-4

68. ANS:
The new volume is 325 mL.

PTS: 1 DIF: B OBJ: 11-4

69. ANS:
Because the density of water is much less than the density of mercury, the atmosphere will support a column of water much higher than 764 mm.

PTS: 1 DIF: A OBJ: 11-2

70. ANS:

1. 116 mL
2. 542 mm Hg
3. -28ºC
4. 252 mL
5. 2.0 L

PTS: 1 DIF: B OBJ: 11-4