1) A gas occupies a volume of 40.0 milliliters at 20°C. If the volume is increased to 80.0 milliliters at constant pressure, the resulting temperature will be equal to

(1) $20°C \times \frac{40.0mL}{80.0mL}$ (2) $20°C \times \frac{80.0mL}{40.0mL}$ (3) $293K \times \frac{40.0mL}{80.0mL}$ (4) $293K \times \frac{80.0mL}{40.0mL}$

2) A 3.00-liter sample of gas is at 288 K and 1.00 atm. If the pressure of the gas is increased to 2.00 atm and its volume is decreased to 1.50 liters, the Kelvin temperature of the sample will be

(1) 576 K (2) 432 K (3) 288 K (4) 144 K

3) Which temperature change would cause the volume of a sample of an ideal gas to double when the pressure of the sample remains the same?

(1) from 200°C to 400°C (2) from 400°C to 200°C (3) from 200 K to 400 K (4) from 400 K to 200 K

4) The temperature of a 2.0-liter sample of helium gas at STP is increased to 27°C and the pressure is decreased to 80. kPa What is the new volume of the helium sample?

(1) 1.4 L (2) 2.0 L (3) 2.8 L (4) 4.0 L

5) As the temperature of a given sample of a gas decreases at constant pressure, the volume of the gas

(1) decreases (2) increases (3) remains the same

6) The pressure on a 200-milliliter sample of $CO_2(g)$ at constant temperature is increased from 60 kPa to 120 kPa. What is the new volume of the gas?

(1) 300 mL (2) 100 mL (3) 600 mL (4) 400 mL

7) A gas has a volume of 1,400 milliliters at a temperature of 20. K and a pressure of 1.0 atm. What will be the new volume when the temperature is changed to 40. K and the pressure is changed to 0.50 atm?

(1) 350 mL (2) 750 mL (3) 1,400 mL (4) 5,600 mL

8) If 60. liters of hydrogen gas at 546 K is cooled to 273 K at constant pressure, the new volume of the gas will be

(1) 120 L (2) 20. L (3) 30. L (4) 40. L

9) A 2.5 liter sample of gas is at STP. When the temperature is raised to 273°C and the pressure remains constant, the new volume of the gas will be

(1) 5.0 L (2) 10. L (3) 1.25 L (4) 2.5 L

* The following are more practice questions for your unit exam. * GAS LAWS

____1. An assumption of the kinetic theory of gases is that the particles of a gas have
(1) little attraction for each other and a significant volume
(2) little attraction for each other and an insignificant volume
(3) strong attraction for each other and a significant volume
(4) strong attraction for each other and an insignificant volume

____2. According to the kinetic theory of gases, which assumption is correct?
(1) Gas particles strongly attract each other.
(2) Gas particles travel in curved paths.
(3) The volume of gas particles prevents random motion.
(4) Energy may be transferred between colliding particles.

____3. Which sample of water will have the highest vapor pressure?
(1) 10.0 ml at 62°C (3) 30.0 ml at 42°C
(2) 20.0 ml at 52°C (4) 40.0 ml at 32°C

____4. As the space between molecules in a gas sample decreases. the tendency for the behavior of this gas to deviate from the ideal gas laws
(1) decreases (3) remains the same
(2) increases

____5. A real gas behaves more like an ideal gas when the gas molecules are
(1) close and have strong attractive forces between them
(2) close and have weak attractive forces between them
(3) far apart and have strong attractive forces between them
(4) far apart and have weak attractive forces between them

____6. At STP. 1 liter of H_2(g) and 1 liter of He(g) have the same
(1) mass (3) number of atoms
(2) density (4) number of molecules

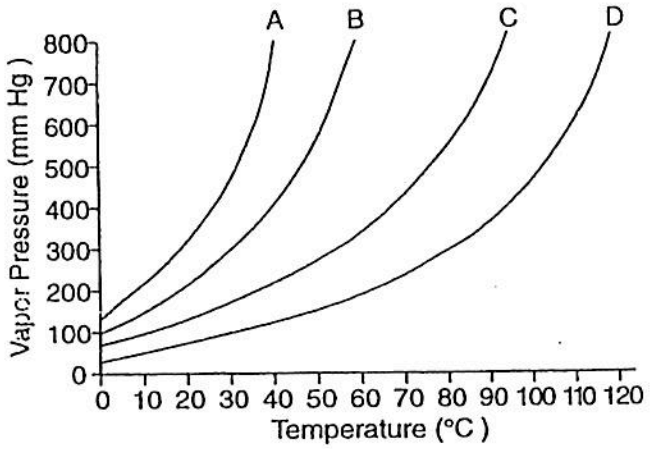
____7. An ideal gas is made up of gas particles that
(1) have volume (3) attract each other
(2) can be liquefied (4) are in random motion

____8. Which 5.0-milliliter sample of NH_3 will take the shape of and completely fill a closed 100.0-milliliter container?
(1) NH_3(s) (3) NH_3 (g)
(2) $NH_3(\ell)$ (4) NH_3 (aq)

____9. At STP. 1 liter of O_2 would have the same number of molecules as
(1) 1 liter of H_2 (3) 3 liters of CO_2
(2) 2 liters of CO (4) 0.5 liter of Ne

____10. A real gas would behave most like an ideal gas under conditions of
(1) low pressure and low temperature
(2) low pressure and high temperature
(3) high pressure and low temperature
(4) high pressure and high temperature

____11. The graph below represents the vapor curves of four liquids.



Which liquid has the highest normal boiling point?
(1) *A* (3) *C*
(2) *B* (4) *D*

____12. A closed container holds 3.0 moles of CO_2 gas at STP. What is the total number of moles of Ne(g) that can be placed in a container of the same size at STP?
(1) 1.0 mole (3) 3.0 moles
(2) 1.5 moles (4) 0.0 moles

____13. As the temperature of a liquid increases, its vapor pressure
(1) decreases (3) remains the same
(2) increases

____14. When the vapor pressure of a liquid is equal to the atmospheric pressure, the liquid will
(1) freeze (3) melt
(2) boil (4) condense

____15. Which sample of water has the *lowest* vapor pressure?
(1) 100 mL at 50°C (3) 300 mL at 40°C
(2) 200 mL at 30°C (4) 400 mL at 20°C

____16. As the atmospheric pressure decreases, the temperature at which water will boil in an open container
(1) decreases (3) remains the same
(2) increases

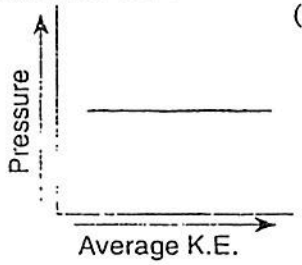
____17. A sample of H_2(g) and a sample of N_2(g) at STP contain the same number of molecules. Each sample must have
(1) the same volume, but a different mass
(2) the same mass. but a different volume
(3) both the same volume and the same mass
(4) neither the same volume nor the same mass

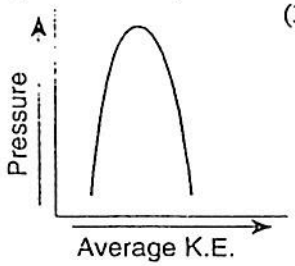
____18. According to Reference Table *H*, what is the vapor pressure of propanone at 45°C?
(1) 22 kPa (3) 70. kPa
(2) 33 kPa (4) 98 kPa

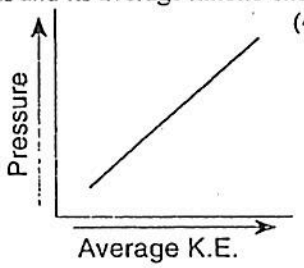
10) What volume will a 300.-milliliter sample of a gas at STP occupy when the pressure is doubled at constant temperature?
(1) 600. ml (2) 300. ml (3) 450. ml (4) 150. ml

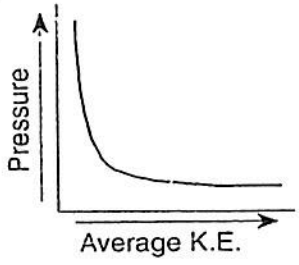
11) Which changes in pressure and temperature occur as a given mass of gas at 50.6 kPa and 546 K is changed to STP?
(1) The pressure is doubled and the temperature is halved.
(2) The pressure is halved and the temperature is doubled.
(3) Both the pressure and the temperature are doubled.
(4) Both the pressure and the temperature are halved.

12) A gas at STP has a volume of 1.0 liter. If the pressure is doubled and the temperature remains constant, the new volume of the gas will be
(1) 0.25 L (2) 2.0 L (3) 0.50 L (4) 4.0 L

13) Which graph best shows the relationship between the pressure of a gas and its average kinetic energy at constant volume?
(1)


(2)


(3)


(4)


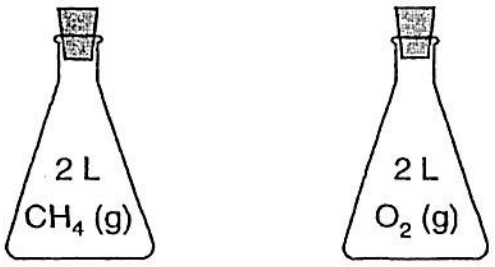
14) A gas sample has a volume of 25.0 milliliters at a pressure of 1.00 atmosphere. If the volume increases to 50.0 milliliters and the temperature remains constant, the new pressure will be
(1) 1.00 atm (2) 2.00 atm (3) 0.250 atm (4) 0.500 atm

15) The volume of a gas is 250 liters at STP. If the pressure of the gas is held constant and the temperature is changed to –25°C. the final volume of the gas, in liters, will be equal to
(1) $250 \times \frac{248}{273}$ (2) $250 \times \frac{298}{273}$ (3) $250 \times \frac{273}{298}$ (4) $250 \times \frac{273}{248}$

16) At a temperature of 273 K, a 400.-milliliter gas sample has a pressure of 760. millimeters of mercury. If the pressure is changed to 380. millimeters of mercury, at which temperature will this gas sample have a volume of 551 milliliters?
(1) 100 K (2) 188 K (3) 273 K (4) 546 K

Answers: 4, 3, 3, 3, 1, 2, 4, 3, 1, 4, 1, 3, 3, 4, 1, 2

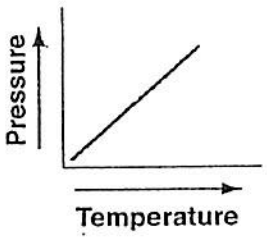
____19. Each stoppered flask below contains 2 liters of a gas at STP.

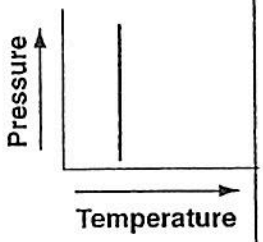


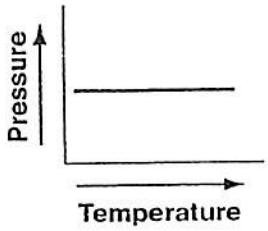
Each gas sample has the same

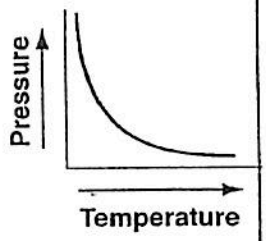
(1) density
(2) mass
(3) number of molecules
(4) number of atoms

____20. Which graph shows the pressure-temperature relationship expected for an ideal gas?

(1)


(3)


(2)


(4)


____21. A real gas differs from an ideal gas because the molecules of real gas have

(1) some volume and no attraction for each other
(2) some volume and some attraction for each other
(3) no volume and no attraction for each other
(4) no volume and some attraction for each other

____22. In a closed system, as the temperature of a liquid increases, the vapor pressure of the liquid

(1) decreases
(2) increases
(3) remains the same

____23. Based on Reference Table *H*, which sample has the highest vapor pressure?

(1) water at 20°C
(2) water at 80°C
(3) ethanol at 50°C
(4) ethanol at 65°C

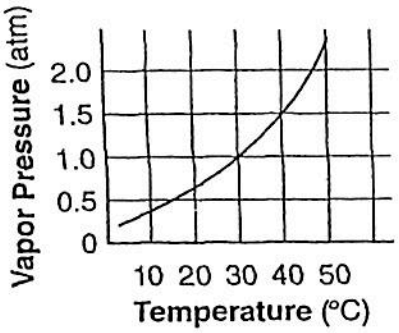
____24. When the vapor pressure of water is 30 kPa, the temperature of the water is

(1) 20°C
(2) 40°C
(3) 70°C
(4) 100°C

____25. When a sample of a gas is heated at constant pressure, the average kinetic energy of its molecules

(1) decreases, and the volume of the gas increases
(2) decreases, and the volume of the gas decreases
(3) increases, and the volume of the gas increases
(4) increases, and the volume of the gas decreases

____26. The graph below shows the relationship between vapor pressure and temperature for substance *X*.



What is the normal boiling point for substance *X*?

(1) 50°C
(2) 20°C
(3) 30°C
(4) 40°C

____27. Under the same conditions of temperature and pressure, which of the following gases would behave most like an ideal gas?

(1) He(g)
(2) NH_3(g)
(3) Cl_2(g)
(4) CO_2(g)

____28. At the same temperature and pressure, 1.0 liter of CO(g) and 1.0 liter of CO_2(g) have

(1) equal masses and the same number of molecules
(2) different masses and a different number of molecules
(3) equal volumes and the same number of molecules
(4) different volumes and a different number of molecules

____29. Which of the following gases behaves most like an ideal gas?

(1) H_2(g)
(2) O_2(g)
(3) NH_3(g)
(4) CO_2(g)

____30. Based on Reference Table *H*, which substance has the weakest intermolecular forces?

(1) ethanoic acid
(2) ethanol
(3) propanone
(4) water

Answers p. 3-4

1) 2
2) 4
3) 1
4) 2
5) 4
6) 4
7) 4
8) 3
9) 1
10) 2
11) 4
12) 3
13) 2
14) 2
15) 4
16) 1
17) 1
18) 3
19) 3
20) 1
21) 2
22) 2
23) 4
24) 3
25) 3
26) 3
27) 1
28) 3
29) 1
30) 3