

“My goodness gaseous!”

Name _____

- C 1. Gases behave most like ideal gases under conditions of A) high temperature and high pressure B) low temperature and low pressure C) high temperature and low pressure D) low temperature and high pressure
- A 2. Gases may deviate from ideal behavior if the molecules A) attract each other B) collide elastically C) bounce off the container walls D) have high kinetic energy
- C 3. 20. mL of a gas is collected at a pressure of 4.0 atmospheres. The gas volume can be decreased to 5.0 mL, at constant temperature, if the pressure becomes A) 1.0 atm B) 2.0 atm C) 16 atm D) 20 atm
- A 4. 50.0 mL of an ideal gas are collected at standard pressure. What is the volume of the gas when, at constant temperature, the pressure is raised to 506.5 kilopascals? A) 10.0 mL B) 20.0 mL C) 75.0 mL D) 250 mL
- C 5. 20.0 L of a gas is collected at a temperature of 25°C. At constant pressure, the temperature is increased to 35°C. The new volume of the gas is
A) $\frac{20.0 \text{ L} \times 25^\circ}{35^\circ}$ B) $\frac{20.0 \text{ L} \times 35^\circ}{25^\circ}$ C) $\frac{20.0 \text{ L} \times 308 \text{ K}}{298 \text{ K}}$ D) $\frac{20.0 \text{ L} \times 298 \text{ K}}{308 \text{ K}}$
- B 6. Which of the following vary **inversely** in ideal gases ? A) Temperature and volume B) pressure and volume C) pressure and temperature D) number of particles and volume
- C 7. Under the same conditions of temperature and pressure, 5.0 liters of CO₂ gas and 5.0 liters of He gas have the same A) mass B) density C) number of molecules D) speed of molecular motion
- A 8. Air consists almost entirely of nitrogen gas and oxygen gas. The air pressure inside a bicycle tire is found to be 500. kP. If the nitrogen gas in the tire is at a pressure of 400 kP, then the oxygen gas has a partial pressure of A) 100 kP B) 400 kP C) 500 kP D) 900 kP
- C 9. A gas tank contains a mixture of helium gas (molecular weight = 4) and oxygen gas (molecular weight = 32). Both gases are at the same temperature. Which of the following must be **greater** for the helium gas than it is for the oxygen gas?
A) The average kinetic energy B) the density C) the speed of molecular motion D) the volume
- A 10. The vapor pressure of propane at 10° C is 180 kPa. A possible normal boiling point of propane is A) – 20° C B) 10° C C) 30° C D) 90° C

- A 11. Which of the liquids on table H evaporates most rapidly at room temperature?
A) propanone B) ethanol C) water D) ethanoic acid.
- D 12. Which of the liquids on table H has the strongest attractions between its molecules?
A) propanone B) ethanol C) water D) ethanoic acid.
- D 13. A chemist finds that an unknown liquid boils at a temperature of 62°C when the external pressure is 50. kilopascals. The unknown liquid might be
A) propanone B) ethanol C) water D) ethanoic acid.
- A 14. Which of the liquids on table H has the lowest normal boiling point?
A) propanone B) ethanol C) water D) ethanoic acid.

Increases, decreases, remains the same

- I 15. As the pressure decreases, the volume of a gas at constant temperature...
- D 16. As the temperature of a gas decreases, the pressure exerted by the gas....
- I 17. As the temperature increases, the vapor pressure of a liquid....
- D 18. As acetone evaporates rapidly from a piece of cotton, the temperature of the cotton....
- I 19. As the external pressure increases, the boiling temperature of a liquid....

Choices for 20 to 23 are g= gases only, l = liquids only, s = solids only, a = all states of matter.

- a 20. The molecules are always in motion
- l 21. Take the shape, but NOT the volume of the container
- g 22. The **product** of sublimation
- g 23. There are negligible (too small to be noticed) attractions between the molecules

24. Solve the following problems, showing your work:

A gas has a volume of 12.0 liters at a pressure of 3.00 atmospheres and a temperature of 27.0°C. What would the volume of the gas become at STP ?

$$\frac{12 \times 3.0}{300} = \frac{V_2 \times 1.0}{273} \quad V_2 = 32.8 \text{ liters}$$

25. A gas initially has a volume of 20.0 milliliters at a pressure of 101.3 kP, and a temperature of 300. K. The gas is expanded to a volume of 50.0 mL. It is then heated until the pressure is 202.6 kP. What is the final temperature of the gas?

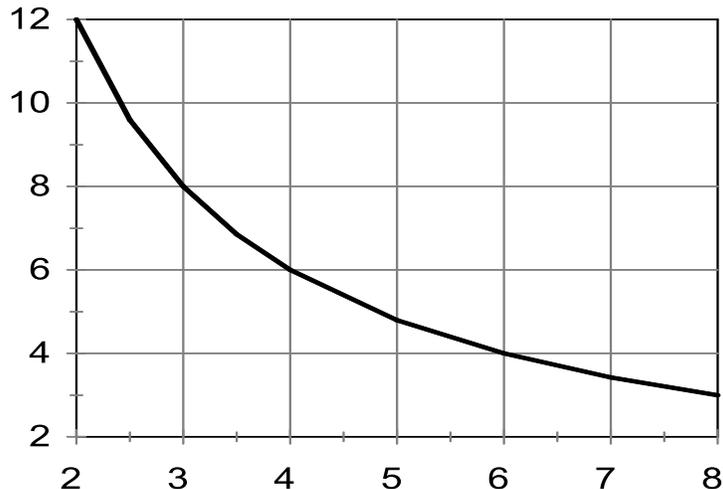
$$\frac{101.3 \times 20.0}{300} = \frac{202.6 \times 50.0}{T} \quad T = 1500 K$$

26. The graph below shows the relationship between two variables used in describing the behavior of gases.

A. The X and Y axis in this graph are not labeled. The Y axis should have been labeled “Volume of ideal gas, in liters” What should be the label of the X axis? Pressure (in any pressure unit)

B. What type of variation is illustrated by this graph?
Inverse variation

C. This graph is produced from the equation “ $XY = k$,” where k is a constant. What is the numerical value of this constant?



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Extra Credit I. Nitrogen behaves like an ideal gas at standard temperature and pressure. However, there are VERY strong attractions between the nitrogen atoms in an N_2 molecule. Aren't ideal gases supposed to have very weak attractions? Explain this apparent contradiction.

II. A student doing a Boyle's Law experiment finds that $PV = 12.0$ liter atmospheres. The temperature is 300 K.

When the experiment is repeated, only half as many gas molecules fill the container, and the temperature is 320 K. What value of “ k ” would the student obtain in the new experiment? (show work)