

Chapter 18

STUDY GUIDE

18.1 VARIABLE CONDITIONS

Complete the sentence or answer the question.

1. According to the kinetic theory, a gas is made of very small particles that are in constant random motion.
2. What are the three factors on which the pressure exerted by a gas depends?
#molecules, vol, ave KE
3. a. If the number of molecules in a constant volume increases, the pressure ↑.
b. If the number of molecules and the volume remain constant, but the kinetic energy of the molecules increases, the pressure ↑.
c. The kinetic energy depends on the T.
4. Study the graph and answer the questions.
a. What gas law is illustrated in the graph?
Boyles
b. Write a sentence describing the relationship represented by the graph.
Vol inversely prop to P



Write T for true or F for false. If a statement is false, replace the underlined word or phrase with one that will make the statement true, and write your correction on the blank provided.

- Partial 5. When a gas is one in a mixture of gases, the pressure exerted by the individual gas is called its ideal pressure.
- Kelvin 6. In calculations involving gases, the temperature given in Celsius must be converted to Fahrenheit.
- T 7. At a constant pressure, the volume of a quantity of gas varies directly with the Kelvin temperature.
- insoluble 8. Gases collected by water displacement must be soluble in water.
- Dalton's 9. Charles's law is represented by $P_{total} = P_1 + P_2 + \dots + P_n$.

Use Tables 18.1 and 18.2 in the text to answer questions 10 and 11.

10. What is the partial pressure of oxygen in the air at standard conditions?
.21 (101.3 kPa) = 21 kPa
11. a. What is the vapor pressure of water at 32°C? 4.8 kPa
b. At what temperature is the vapor pressure of water 2.2 kPa? 19°C

12. Complete the table by using Boyle's law. In the column labeled *Change in volume*, indicate whether the volume increases or decreases. In the next column, write the two possible ratios for pressure and circle the appropriate ratio needed for calculations. Calculate the final volume.

Initial volume	Change in pressure	Change in volume	Pressure ratios	Final volume
26 cm ³	55.8 kPa to 110.1 kPa	↓	$\frac{55.8}{110.1}$	13 cm ³
131 dm ³	225 kPa to 650.5 kPa	↓	$\frac{225}{6}$	45.3 dm ³
88 dm ³	36.8 kPa to 22.4 kPa	↑		140 dm ³
925.0 cm ³	151.2 kPa to 119.7 kPa	↑		1168 dm ³ cm ³
0.621 m ³	49.5 kPa to 76.2 kPa	↓		403 m ³

13. A 400 cm³ volume of gas is collected at 26°C. What volume would this gas occupy at standard conditions? Assume a constant pressure.

$$\frac{400}{(26+273)} = \frac{V}{273} \quad V = 3.65 \times 10^2 \text{ cm}^3$$

29.9

Match each equation below with the correct descriptions.

a. $P_{\text{gas}} = P_{\text{total}} - P_{\text{water}}$ b. $PV = k$ c. $P_{\text{total}} = P_1 + P_2 + \dots + P_n$ d. $V = k/T$ e. $K = ^\circ\text{C} + 273.15$

e 14. relationship between the Kelvin and Celsius temperature scales

b 15. Boyle's law

d 16. Charles's law

c 17. Dalton's law

a 18. used to find pressure of a gas collected over water