243. A balloon full of air has a volume of 2.75 L at a temperature of 18°C. What is the balloon's volume at 45°C?

244. A sample of argon has a volume of 0.43 mL at 24°C. At what temperature in degrees Celsius will it have a volume of 0.57 mL?

Gay-Lussac's Law

In each of the following problems, assume that the volume and molar quantity of gas do not change.

245. Calculate the unknown quantity in each of the following measurements of gases.

P_1	T_1	P_2	T_2
a. 1.50 atm	273 K	? atm	410 K
b. 0.208 atm	300. K	0.156 atm	? K
c. ? kPa	52°C	99.7 kPa	77°C
d. 5.20 atm	?°C	4.16 atm	−13°C
e. 8.33×10^{-4} atm	−84°C	3.92×10^{-3} atm	? °C

246. A cylinder of compressed gas has a pressure of 4.882 atm on one day. The next day, the same cylinder of gas has a pressure of 4.690 atm, and its temperature is 8°C. What was the temperature on the previous day in °C?

247. A mylar balloon is filled with helium gas to a pressure of 107 kPa when the temperature is 22°C. If the temperature changes to 45°C, what will be the pressure of the helium in the balloon?

The Combined Gas Law

In each of the following problems, it is assumed that the molar quantity of gas does not change.

248. Calculate the unknown quantity in each of the following measurements of gases.

P_1	V_1	T_1	P_2	V_2	T_2
a. 99.3 kPa	225 mL	15°C	102.8 kPa	? mL	24°C
b. 0.959 atm	3.50 L	45°C	? atm	3.70 L	37°C
c. 0.0036 atm	62 mL	373 K	0.0029 atm	64 mL	? K
d. 100. kPa	43.2 mL	19°C	101.3 kPa	? mL	0°C

249. A student collects 450. mL of HCl(g) hydrogen chloride gas at a pressure of 100. kPa and a temperature of 17°C. What is the volume of the HCl at 0°C and 101.3 kPa?

Dalton's Law of Partial Pressures

250. A chemist collects a sample of $H_2S(g)$ over water at a temperature of 27°C. The total pressure of the gas that has displaced a volume of 15 mL of water is 207.33 kPa. What is the pressure of the H_2S gas collected?

In each of the following problems, assume that the molar quantity of gas does not change.

251. Some hydrogen is collected over water at 10°C and 105.5 kPa pressure. The total volume of the sample was 1.93 L. Calculate the volume of the hydrogen corrected to STP.

252. One student carries out a reaction that gives off methane gas and obtains a total volume by water displacement of 338 mL at a temperature of 19°C and a pressure of 0.9566 atm. Another student does the identical experiment on another day at a temperature of 26°C and a pressure of 0.989 atm. Which student collected more CH_4?

Mixed Review

In each of the following problems, assume that the molar quantity of gas does not change.

253. Calculate the unknown quantity in each of the following measurements of gases.

P_1	V_1	P_2	V_2
a. 127.3 kPa	796 cm^3	? kPa	965 cm^3
b. 7.1×10^2 atm	? mL	9.6×10^{-1} atm	3.7×10^3 mL
c. ? kPa	1.77 L	30.79 kPa	2.44 L
d. 114 kPa	2.93 dm^3	4.93×10^4 kPa	? dm^3
e. 1.00 atm	120. mL	? atm	97.0 mL
f. 0.77 atm	3.6 m^3	1.90 atm	? m^3

254. A gas cylinder contains 0.722 m^3 of hydrogen gas at a pressure of 10.6 atm. If the gas is used to fill a balloon at a pressure of 0.96 atm, what is the volume in m^3 of the filled balloon?

255. A weather balloon has a maximum volume of 7.50×10^3 L. The balloon contains 195 L of helium gas at a pressure of 0.993 atm. What will be the pressure when the balloon is at maximum volume?

256. A rubber ball contains 5.70×10^{-1} dm^3 of gas at a pressure of 1.05 atm. What volume will the gas occupy at 7.47 atm?

257. Calculate the unknown quantity in each of the following measurements of gases.

V_1	T_1	V_2	T_2
a. 26.5 mL	? K	32.9 mL	290. K
b. ? dm^3	100.°C	0.83 dm^3	29°C
c. 7.44×10^4 mm^3	870.°C	2.59×10^2 mm^3	? °C
d. 5.63×10^{-2} L	132 K	? L	190. K
e. ? cm^3	243 K	819 cm^3	409 K
f. 679 m^3	−3°C	? m^3	−246°C