(**Q1**) Convert 562 mmHg to atm.
1 atm = 760 mmHg.
0.739 atm.

(**Q2**) Convert 606 mmHg to atm and kPa?
1 atm = 760 mmHg = 1.01325 x 10^5 Pa (SI unit) = 101.325 kPa.
0.797 atm; 80.8 kPa.

(**Q3**) A gas occupying a volume of 725 mL at a pressure of 0.970 atm is allowed to expand at constant temperature until its pressure reaches 0.541 atm. What is its final volume?
1300 mL.

(**Q4**) At 46°C a sample of ammonia gas exerts a pressure of 5.3 atm. What is the pressure when the volume of the gas is reduced to one-tenth (0.10) of the original value at the same temperature?
Suppose V_1 = 10 mL then V_2 = 1 mL.
53 atm.

(**Q5**) A sample of air occupies 3.8 L when the pressure is 1.2 atm. (The temperature is kept constant).
(a) What volume does it occupy at 6.6 atm? 0.691 L.
(b) What pressure is required in order to compress it to 0.075 L? 60.8 atm.

(**Q6**) Under constant-pressure conditions a sample of hydrogen gas initially at 88°C and 9.6 L is cooled until its final volume is 3.4 L. What is its final temperature?
127.85 K (-145.15^{o}C).

(**Q7**) Given that 6.9 moles of carbon monoxide gas are present in a container of volume 30.4 L, what is the pressure of the gas (in atm) if the temperature is 62°C?
6.23 atm.

(**Q8**) A certain amount of gas at 25°C and at a pressure of 0.800 atm is contained in a glass vessel. Suppose that the vessel can withstand a pressure of 2.00 atm. How high can you raise the temperature of the gas without bursting the vessel?

745 K.

(**Q9**) The temperature of 2.5 L of a gas initially at STP is raised to 250°C at constant volume. Calculate the final pressure of the gas in atm.

STP (P = 1 atm; T = 273 K)

1.92 atm.

(**Q10**) A gas evolved during the fermentation of glucose has a volume of 0.78 L at 20.1°C and 1.00 atm. What was the volume of this gas at the fermentation temperature of 36.5°C and 1.00 atm pressure?

0.824 L.

(**Q11**) Calculate the volume (in liters) of 88.4 g of CO_2 at STP.

n = 88.4 / 44 = 2.01 mol

45 L.

(**Q12**) Dry ice is solid carbon dioxide. A 0.050-g sample of dry ice is placed in an evacuated 4.6-L vessel at 30°C. Calculate the pressure inside the vessel after all the dry ice has been converted to CO_2 gas.

6.14×10^{-3} atm.

(**Q13**) At 741 torr and 44°C, 7.10 g of a gas occupy a volume of 5.40 L. What is the molar mass of the gas?

35 g/mol.

(**Q14**) Assuming that air contains 78 percent N_2, 21 percent O_2, and 1 percent Ar, all by volume, how many molecules of each type of gas are present in 1.0 L of air at STP?
$N = 6.022 \times 10^{23} \times n$
N_2: 2.1×10^{22}
O_2: 5.7×10^{21}
Ar: 3×10^{20}

(**Q15**) Calculate the density of hydrogen bromide (HBr) gas in grams per liter at 733 mmHg and 46°C.
2.97 g/L.

(**Q16**) A compound has the empirical formula SF_4. At 20°C, 0.100 g of the gaseous compound occupies a volume of 22.1 mL and exerts a pressure of 1.02 atm. What is the molecular formula of the gas?
SF_4.

(**Q17**) Methane, the principal component of natural gas, is used for heating and cooking. The combustion process is
$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$
If 15.0 moles of CH_4 are reacted, what is the volume of CO_2 (in liters) produced at 23.0°C and 0.985 atm?
370 L.

(**Q18**) A 2.5-L flask at 15°C contains a mixture of N_2, He, and Ne at partial pressures of 0.32 atm for N_2, 0.15 atm for He, and 0.42 atm for Ne.
(a) Calculate the total pressure of the mixture. 0.89 atm.
(b) Calculate the volume in liters at STP occupied by He and Ne if the N_2 is removed selectively. 1.35 L.

(**Q19**) A mixture of helium and neon gases is collected over water at 28.0°C and 745 mmHg. If the partial pressure of helium is 368 mmHg, what is the partial pressure of neon? (Vapor pressure of water at 28°C 5 28.3 mmHg).
349 mmHg (0.459 atm).

(**Q20**) A sample of ammonia (NH_3) gas is completely decomposed to nitrogen and hydrogen gases over heated iron wool. If the total pressure is 866 mmHg, calculate the partial pressures of N_2 and H_2.
H_2: 650 mmHg.
N_2: 217 mmHg.

(**Q21**) A sample of zinc metal reacts completely with an excess of hydrochloric acid:
$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$
The hydrogen gas produced is collected over water at 25.0°C. The volume of the gas is 7.80 L, and the pressure is 0.980 atm. Calculate the amount of zinc metal in grams consumed in the reaction. (Vapor pressure of water at 25°C 5 23.8 mmHg).
19.8 g.