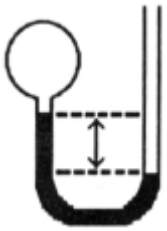
MQ13 Study Guide

1) A gas vessel is attached to an open-end manometer containing a nonvolatile liquid of density 0.791 g/mL as shown below.



The difference in heights of the liquid in the two sides of the manometer is 43.4 cm when the atmospheric pressure is 755 mmHg. Given that the density of mercury is 13.6 g/mL, the pressure of the enclosed gas is _____ atm.

2) A sample of gas (24.2 g) initially at 4.00 atm was compressed from 8.00 L to 2.00 L at constant temperature. After the compression, the gas pressure was _____ atm.

3) A balloon originally had a volume of 4.39 L at 44 °C and a pressure of 729 torr. The balloon must be cooled to _____°C to reduce its volume to 3.78 L (at constant pressure).

4) A gas originally at 27 °C and 1.00 atm pressure in a 3.9 L flask is cooled at constant pressure until the temperature is 11 °C. The new volume of the gas is _____ L.

5) A sample of He gas (2.35 mol) occupies 57.9 L at 300.0 K and 1.00 atm. The volume of this sample is _____ L at 423 K and 1.00 atm.

6) A sample of an ideal gas (3.00 L) in a closed container at 25.0 °C and 76.0 torr is heated to 300 °C. The pressure of the gas at this temperature is _____ torr.

8) At a temperature of _____ °C, 0.444 mol of CO gas occupies 11.8 L at 889 torr.

9) A sample of gas (1.9 mol) is in a flask at 21 °C and 697 mmHg. The flask is opened and more gas is added to the flask. The new pressure is 795 mmHg and the temperature is now 26 °C. There are now _____ mol of gas in the flask.

10) The density of ammonia gas in a 4.32 L container at 837 torr and 45.0 °C is _____ g/L.

11) The molecular weight of a gas is _____ g/mol if 3.5 g of the gas occupies 2.1 L at STP.

12) The molecular weight of a gas that has a density of 6.70 g/L at STP is _____ g/mol.

13) The molecular weight of a gas that has a density of 7.10 g/L at 25.0 °C and 1.00 atm pressure is _____ g/mol.

14) The volume of hydrogen gas at 38.0 °C and 763 torr that can be produced by the reaction of 4.33 g of zinc with excess sulfuric acid is _____ L.

15) The Mond process produces pure nickel metal via the thermal decomposition of nickel tetracarbonyl:

$Ni(CO)_4$ (l) $\rightarrow$ Ni (s) + 4CO (g).

What volume (L) of CO is formed from the complete decomposition of 444 g of $Ni(CO)_4$ at 752 torr and 22.0 °C?

16) The pressure in a 12.2 L vessel that contains 2.34 g of carbon dioxide, 1.73 g of sulfur dioxide, and 3.33 g of argon, all at 42 °C is _____ mmHg.

17) A sample of He gas (3.0 L) at 5.6 atm and 25 °C was combined with 4.5 L of Ne gas at 3.6 atm and 25 °C at constant temperature in a 9.0 L flask. The total pressure in the flask was _____ atm. Assume the initial pressure in the flask was 0.00 atm.

24) Which of the following statements about gases is false?
A) Gases are highly compressible.
B) Distances between molecules of gas are very large compared to bond distances within molecules.
C) Non-reacting gas mixtures are homogeneous.
D) Gases expand spontaneously to fill the container they are placed in.
E) All gases are colorless and odorless at room temperature.

25) One significant difference between gases and liquids is that _____.
A) a gas is made up of molecules
B) a gas assumes the volume of its container
C) a gas may consist of both elements and compounds
D) gases are always mixtures
E) All of the above answers are correct.

29)Determine the number of liters of O_2 consumed at STP when 270.0 grams of C_2H_6 is burned.