AP CHEMISTRY CHAPTER 5 SAMPLE PROBLEMS

Sample problem 1

The pressure of a gas is measured as 49 torr. Represent this pressure in both atmospheres and Pascals

Sample problem 2

Sulfur dioxide, a gas that plays a central role in the formation of acid rain, is found in the exhaust of automobiles and power plants. Consider a 1.53 L sample of gaseous sulfur dioxide at a pressure of 5.6 x 103 Pa. If the pressure is changed to 1.5 x 104 Pa at constant temperature, what will be the new volume of the gas?

Sample problem 4

A sample of gas at 15oC and 1 atm has a volume of 2.58 L. What volume will the gas occupy at 38oC and 1 atm?

Sample problem 5

Suppose we have a 12.2 L sample containing 0.50 mol oxygen gas at a pressure of 1 atm and a temperature of 25oC. If al this oxygen were converted to ozone at the same temperature and pressure, what would be the volume of ozone?

Sample problem 6

A sample of hydrogen gas has a volume of 8.56 L at a temperature of 0oC and a pressure of 1.5 atm. Calculate the moles of hydrogen molecules present in the gas sample.

Sample problem 7

Suppose we have a sample of ammonia gas with a volume of 3.5 L at a pressure of 1.68 atm. The gas is compressed to a volume of 1.35 L at a constant temperature.

Sample problem 8

A sample of methane gas that has a volume of 3.8 L at 5oC is heated to 86oC at constant pressure. Calculate its new volume.

Sample problem 9

A sample of diborane gas (B2H6), a substance that bursts into flame when exposed to air, has a pressure of 345 torr at a temperature of -15oC and a volume of 3.48 L. If conditions are changed so that the temperature is 36oC and the pressure is 468 torr, what will be the volume of the sample?

Sample problem 10

A sample containing 0.35 mol argon gas at a temperature of 13oC and a pressure of 568 torr is heated to 56oC and a pressure of 897 torr. Calculate the change in volume that occurs.

Sample problem 11

A sample of nitrogen gas has a volume of 1.75 L at STP. How many moles of nitrogen are present?

Sample problem 12

Quicklime (CaO) is produced by the thermal decomposition of calcium carbonate. Calculate the volume of CO2 at STP produced from the decomposition of 152 g of calcium carbonate.

Sample problem 13

A sample of methane gas having a volume of 2.80 L at 25oC and 1.65 atm was mixed with a sample of oxygen gas having a volume of 35.0 L at 31oC and 1.25 atm. The mixture was then ignited to form carbon dioxide and water. Calculate the volume of CO2 formed at a pressure of 2.50 atm and a temperature of 125oC.

Sample problem 14

The density of a gas was measured at 1.50 atm and 27oC and found to be 1.95 g/L. Calculate the molar mass of the gas.

Sample problem 15

Mixtures of helium and oxygen are used in scuba diving tanks to help prevent “the bends”. For a particular dive, 46 L O2 at 25oC and 1.0 atm and 12 L He at 25oC and 1.0 atm were pumped into a tank with a volume of 5.0 L. Calculate the partial pressure of each gas and the total pressure in the tank at 25oC.

Sample problem 16

The partial pressure of oxygen was observed to be 156 torr in air with an atmospheric pressure of 743 torr. Calculate the mole fraction of O2 present

Sample problem 17

The mole fraction of nitrogen in the air is 0.7808. Calculate the partial pressure of N2 in air when the atmospheric pressure is 760. torr.

Sample problem 18

A sample of solid potassium chlorate was heated in a test tube and decomposed by the following reaction.

2KClO3(s) → 2KCl(s) + 3O2(g)

The oxygen produced was collected by displacement of water at 22oC at a total pressure of 754 torr. The volume of the gas collected was 0.650 L and the vapor pressure of water at 22oC and 21 torr. Calculate the partial pressure of oxygen in the gas collected and the mass of the KClO3 in the sample that was decomposed.

Sample problem 19

Calculate the root mean square velocity for the atom in a sample of helium gas at 25oC

Sample Problem 19

Calculate the ratio of the effusion rates of hydrogen gas and uranium hexafluoride, a gas used in the enrichment process to produce fuel for nuclear reactors.

Sample Problem 20

Calculate the ratio of the effusion rates of hydrogen gas and uranium hexafluoride, a gas used in the enrichment process to produce fuel for nuclear reactors.