

GASES AND THEIR PROPERTIES - LECTURE NOTES

Homework Answers (solutions to the homework) (the 2's) – Craig

PRACTICE PROBLEMS:

1. You collect a sample of oxygen gas by the water-displacement method described in the example. If the atmospheric pressure is 99.4 kPa and the water-vapor pressure is 4.5 kPa, then what is the partial pressure of the oxygen gas. (answer: 94.9 kPa)

Answer:

$$P_T = 99.4 \text{ kPa}; P_{H_2O} = 4.5 \text{ kPa}$$

$$P_T = P_{O_2} + P_{H_2O}$$

$$99.4 \text{ kPa} = P_{O_2} + 4.5 \text{ kPa}$$

$$P_{O_2} = 99.4 \text{ kPa} - 4.5 \text{ kPa} = 94.9 \text{ kPa}$$

2. A mixture of 84.06 grams of nitrogen gas and 83.80 grams of krypton gas has a total pressure of 280. kPa. What is the partial pressure of each gas? (answer: $N_2 = 210.$ kPa, $Kr = 70.0$ kPa)

Answer:

$$P_T = P_{N_2} + P_{Kr}$$

$$\frac{84.06 \text{ g } N_2}{28} \times \frac{1 \text{ mol } N_2}{28 \text{ g}} = 1.5 \text{ mol } N_2$$

$$\frac{83.80 \text{ g } Kr}{83.80 \text{ g}} \times \frac{1 \text{ mol } Kr}{83.80 \text{ g}} = 1.0 \text{ mol } Kr$$

3.0 mole + 1.0 mole = 4.0 moles of total gas

$$P_{N_2} = \frac{3}{4} (280 \text{ kPa}) = 210 \text{ kPa}$$

$$P_{Kr} = \frac{1}{4} (280 \text{ kPa}) = 70 \text{ kPa}$$

$$P_T = P_{N_2} + P_{Kr} = 210 \text{ kPa} + 70 \text{ kPa} = 280 \text{ kPa}$$