MIXED MOLE PROBLEMS

Name __Key__

Solve the following problems.

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1. How many grams are there in 1.5×10^{25} molecules of CO_2?

$$\frac{1.5 \times 10^{25} \text{ molecules } CO_2}{} \left| \frac{1 \text{ mol } CO_2}{6.02 \times 10^{23} \text{ molecules } CO_2} \right| \frac{44.0 \text{ g } CO_2}{1 \text{ mol } CO_2} = 1096.3$$

__1100 g CO_2__

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2. What volume would the CO_2 in Problem 1 occupy at STP?

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$$\left| \frac{22.4 \text{ L } CO_2}{1 \text{ mol } CO_2} \right| = 558.1$$

__560 L CO_2__

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3. A sample of NH_3 gas occupies 75.0 liters at STP. How many molecules is this?

$$\frac{75.0 \text{ L } NH_3}{22.4 \text{ L } NH_3} \left| \frac{1 \text{ mol } NH_3}{1 \text{ mol } NH_3} \right| \frac{6.02 \times 10^{23} \text{ molecules } NH_3}{} = 2.015 \times 10^{24}$$

__2.02×10^{24} molecules NH_3__

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4. What is the mass of the sample of NH_3 in Problem 3?

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$$\left| \frac{17.0 \text{ g } NH_3}{1 \text{ mol } NH_3} \right| = 56.91$$

__56.9 g NH_3__

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5. How many atoms are there in 1.3×10^{22} molecules of NO_2? 1 molecule = # atoms

$$\frac{1.3 \times 10^{22} \text{ molecules } NO_2}{} \left| \frac{3 \text{ atoms } NO_2}{1 \text{ molecule } NO_2} \right| =$$

__3.9×10^{22} atoms NO_2__

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6. A 5.0 g sample of O_2 is in a container at STP. What volume is the container?

$$\frac{5.0 \text{ g } O_2}{} \left| \frac{1 \text{ mol } O_2}{32.0 \text{ g } O_2} \right| \frac{22.4 \text{ L } O_2}{1 \text{ mol } O_2} =$$

__3.5 L O_2__

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7. How many molecules of O_2 are in the container in Problem 6? How many atoms of oxygen?

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$$\left| \frac{6.02 \times 10^{23} \text{ molecules } O_2}{1 \text{ mol } O_2} \right|$$

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$$\left| \frac{2 \text{ atoms } O_2}{1 \text{ molecule } O_2} \right|$$

__9.4×10^{22} molecules O_2__
__1.9×10^{23} atoms O_2__

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