

Warm Up

WANT
HAVE

Calculate the number of moles found in 8.90×10^{24} molecules of NH_3 .

$$\begin{aligned} & \underline{8.90 \times 10^{24}} \text{ molecules } \text{NH}_3 \times \frac{1 \text{ mol } \text{NH}_3}{6.02 \times 10^{23} \text{ molecules } \text{NH}_3} \\ & = \boxed{14.8 \text{ mol } \text{NH}_3} \end{aligned}$$

Homework

Worksheet - Molar Calculations

$$\textcircled{11} \quad 27.1 \text{ g } \cancel{\text{Al}_2\text{O}_3} \times \frac{1 \text{ mol } \cancel{\text{Al}_2\text{O}_3}}{101.96 \text{ g } \cancel{\text{Al}_2\text{O}_3}} = \boxed{0.266 \text{ mol } \text{Al}_2\text{O}_3}$$

$$\text{Al}_2\text{O}_3 \rightarrow (2 \times 26.98) + (3 \times 16.00) = 101.96 \text{ g/mol}$$

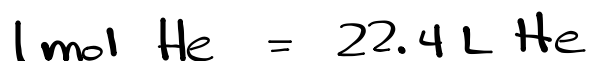
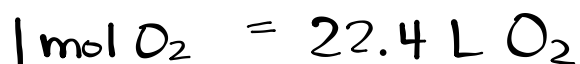
Molar calculations worksheet

1. 8.97×10^3 mol
2. 1.49×10^{25} atoms
3. 1.30×10^{26} atoms
4. 46.01 g/mol
5. 14 300 mol
6. 342.34 g/mol
7. 159.70 g/mol
8. 4.24×10^{24} molecules
9. 1.79×10^{25} atoms
10. 643 g
11. 0.266 mol
12. 10 900 g
13. 6.26 mol

Mole-Volume Relationship

Avagadro's Hypothesis

Equal volumes of gases at the same temperature and pressure contain equal number of particles.



Standard temperature and pressure (STP)

0.°C and 101.3kPa

At STP, 1 mol (6.02×10^{23} representative particles) of any gas contains 22.4 L.

$$V_m @ \text{STP} = 22.4 \text{ L/mol}$$

Calculating Volume at STP

Ex. Determine the volume of oxygen gas will 0.375 mol occupy at **STP**.

$$0.375 \text{ mol } \cancel{\text{O}_2} \times \frac{22.4 \text{ L O}_2}{1 \cancel{\text{ mol O}_2}} = \boxed{8.40 \text{ L O}_2}$$

Homework

p. 301 #20, 21

p. 303 #24-28, 31