Molar Volume
Practice Problems

① $0.0032 \text{ mol } CO_2 \times \dfrac{22.4 \text{ L}}{1 \text{ mol}} = 0.072 \text{ L } CO_2$

② $3.70 \text{ mol } N_2 \times \dfrac{22.4 \text{ L}}{1 \text{ mol}} = 82.88 \text{ L } N_2$

③ $1.25 \text{ L He} \times \dfrac{1 \text{ mol}}{22.4 \text{ L}} = 0.056 \text{ mol He}$

④ $0.335 \text{ L } C_2H_6 \times \dfrac{1 \text{ mol}}{22.4 \text{ L}} = 0.015 \text{ mol } C_2H_6$

⑤ gas A

$1.25 \text{ g/L} \times \dfrac{22.4 \text{ L}}{1 \text{ mol}} = 28.00 \text{ g/mol}$

gas B

$\dfrac{2.86 \text{ g}}{L} \times \dfrac{22.4 \text{ L}}{1 \text{ mol}} = 64.06 \text{ g/mol}$

gas C

$\dfrac{0.714 \text{ g}}{L} \times \dfrac{22.4 \text{ L}}{1 \text{ mol}} = 15.99 \text{ g/mol}$

molar masses
approximately equal

N_2

SO_2

CH_4

NH_3

$1 \times N = 1 \times 14.01 \text{ g/mol} = 14.01 \text{ g/mol}$

$3 \times H = 3 \times 1.01 \text{ g/mol} = \underline{3.03 \text{ g/mol}}$

$\phantom{3 \times H = 3 \times 1.01 \text{ g/mol} = } 17.04 \text{ g/mol}$

SO_2

$1 \times S = 1 \times 32.06 \text{ g/mol} = 32.06 \text{ g/mol}$

$2 \times O = 2 \times 16.00 \text{ g/mol} = \underline{32.00 \text{ g/mol}}$

$\phantom{2 \times O = 2 \times 16.00 \text{ g/mol} = } 64.06 \text{ g/mol} \quad \leftarrow \text{ gas B}$

Cl_2

$2 \times Cl = 2 \times 35.45 \text{ g/mol} = 70.90 \text{ g/mol}$

N_2

$2 \times N = 2 \times 14.01 \text{ g/mol} = 28.02 \text{ g/mol} \quad \leftarrow \text{ gas A}$

CH_4

$1 \times C = 1 \times 12.01 \text{ g/mol} = 12.01 \text{ g/mol}$

$4 \times H = 4 \times 1.01 \text{ g/mol} = \underline{4.04 \text{ g/mol}}$

$\phantom{4 \times H = 4 \times 1.01 \text{ g/mol} = } 16.05 \text{ g/mol} \quad \leftarrow \text{ gas C}$