

$$20. \quad \left. \begin{array}{l} V_{\text{NO}_2} = ? \\ \text{part}_{\text{NO}_2} = 6.85 \times 10^{21} \text{ molecules} \end{array} \right\} \text{STP.}$$

$$n_{\text{NO}_2} = \frac{\text{part}}{N_A} = \frac{6.85 \times 10^{21} \text{ molecules}}{6.022 \times 10^{23} \text{ molecules/mol}} = 0.01137 \text{ mol}$$

$$V_{\text{NO}_2} = n \times MV = (0.01137 \text{ mol}) \left(22.4 \frac{\text{L}}{\text{mol}}\right) = 0.255 \text{ L}$$

$$21. \quad \begin{array}{l} M_{\text{Na}_2\text{Si}_2\text{O}_7} = 18.5 \text{ g} \\ V = 150.0 \text{ mL} = 0.1500 \text{ L} \\ C = ? \end{array} \quad \begin{array}{l} M_{\text{Na}_2\text{Si}_2\text{O}_7} = 2 \times M_{\text{Na}} + 1 \times M_{\text{Si}} + 7 \times M_{\text{O}} \\ = 2 \times 22.99 + 1 \times 28.09 + 7 \times 16.00 \\ = 122.07 \text{ g/mol} \end{array}$$

$$n_{\text{Na}_2\text{Si}_2\text{O}_7} = \frac{m}{M} = \frac{18.5 \text{ g}}{122.07 \text{ g/mol}} = 0.1516 \text{ mol}$$

$$C_{\text{Na}_2\text{Si}_2\text{O}_7} = \frac{n}{V} = \frac{0.1516 \text{ mol}}{0.1500 \text{ L}} = 1.01 \text{ mol/L}$$

$$22. \quad \begin{array}{l} M_{\text{Na}_2\text{Si}_2\text{O}_7} = ? \\ V = 8.0 \text{ L} \\ C = 0.0250 \text{ mol/L} \end{array} \quad M_{\text{Na}_2\text{Si}_2\text{O}_7} = 122.07 \text{ g/mol}$$

$$n_{\text{Na}_2\text{Si}_2\text{O}_7} = C \times V = (0.0250 \text{ mol/L}) (8.0 \text{ L}) = 0.200 \text{ mol}$$

$$M_{\text{Na}_2\text{Si}_2\text{O}_7} = n \times M = (0.200 \text{ mol}) (122.07 \text{ g/mol}) = 24.4 \text{ g}$$

$$23. \quad \begin{array}{l} C_{\text{Na}_3\text{PO}_4} = 0.560 \frac{\text{mol}}{\text{L}} \\ V_{\text{Na}_3\text{PO}_4} = ? \\ M_{\text{Na}_3\text{PO}_4} = 86.9 \text{ g} \end{array} \quad \begin{array}{l} M_{\text{Na}_3\text{PO}_4} = 3 \times M_{\text{Na}} + 1 \times M_{\text{P}} + 4 \times M_{\text{O}} \\ = 3 \times 22.99 + 1 \times 30.97 + 4 \times 16.00 \\ = 163.94 \text{ g/mol} \end{array}$$

$$n_{\text{Na}_3\text{PO}_4} = \frac{m}{M} = \frac{86.9 \text{ g}}{163.94 \text{ g/mol}} = 0.530 \text{ mol}$$

$$V_{\text{Na}_3\text{PO}_4} = \frac{n}{C} = \frac{0.530 \text{ mol}}{0.560 \text{ mol/L}} = 0.947 \text{ mol/L}$$