1. If 4.00 moles of gasoline are burned, what volume of oxygen is needed if the pressure is 0.953 atm, and the temperature is 35.0 °C?

\[
\frac{PV}{nRT} = \frac{\text{4.00 mol C}_8\text{H}_{18} \times 25 \text{ mol O}_2}{\text{2 mol C}_8\text{H}_{18}} = \frac{50 \text{ mol O}_2}{0.953 \text{ atm}}
\]

\[
V = nRT = \frac{(50 \text{ mol})(0.0821)(308K)}{0.953 \text{ atm}} = 1393 \text{ L}
\]

2. How many grams of water would be produced if 20.0 liters of oxygen were burned at a temperature of -10.0 °C and a pressure of 1.3 atm?

\[
\frac{PV}{nRT} = \frac{1.2 \text{ mol O}_2}{(1.3 \text{ atm})(20.0 \text{ L})} = \frac{n = 1.2 \text{ mol H}_2O}{(0.0821)(245K)}
\]

3. If you burned one gallon of gasoline (approx. 4000 g), how many liters of carbon dioxide would be produced at a temperature of 21.0 °C and a pressure of 1.00 atm?

\[
\frac{PV}{nRT} = \frac{4,000 \text{ g C}_8\text{H}_{18} \times 1 \text{ mol C}_8\text{H}_{18}}{114.26 g \times 2 \text{ mol C}_8\text{H}_{18}} = \frac{38.0 \text{ mol CO}_2}{n = \frac{(28.0 \times 0.0821)(294K)}{6700 \text{ L}} \times 1.00 \text{ atm}}
\]

4. How many liters of oxygen would be needed to produce 45.0 liters of carbon dioxide if the temperature and pressure for both are 0.00 °C and 5.02 atm?

\[
\frac{PV}{nRT} = \frac{70.5 \text{ L O}_2}{(5.02 \text{ atm})(158 \text{ mol CO}_2)} = \frac{10.1 \text{ mol C}_2 \times 25 \text{ mol O}_2}{(0.0821)(873K)} = \frac{n = 15.8 \text{ mol O}_2}{16 \text{ mol CO}_2}
\]