

CHAPTER 7	Gas Stoichiometry Problems	BLM 7.2.7
ASSESSMENT		

The following questions are stoichiometric in nature, and therefore require the calculation of moles at some point. To do this, the gas laws must be used. Just a few reminders: In $PV=nRT$, the volume has to be in litres, the pressure in kPa, and the temperature in Kelvin ($^{\circ}\text{C} + 273 = \text{K}$). The value of the gas constant R , is $8.314 \frac{\text{kPa}\cdot\text{L}}{\text{mol}\cdot\text{K}}$.

1. The production of a gas to fill an airbag rapidly is accomplished by the following reaction:
- $$2\text{NaN}_3(\text{s}) \rightarrow 2\text{Na}(\text{s}) + 3\text{N}_2(\text{g})$$

(a) How many moles of nitrogen gas will form from the reaction of 4.76 mol of $\text{NaN}_3(\text{s})$?

(b) If 117 g of sodium azide ($\text{NaN}_3(\text{s})$) react, how many litres of nitrogen gas will form at 20.2°C and 101.2 kPa?

(c) How many grams of sodium metal will form as 10.5 L of nitrogen form at 25.0°C and 132.0 kPa?

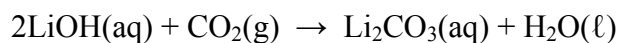
2. Write and balance the reaction where iron reacts with sulfuric acid to produce hydrogen gas and iron(II) sulfate.

(a) If 4.35 mol of iron react, how many moles of hydrogen gas form?

(b) If 40.0 g of iron react with the acid, how many litres of gas would form if the temperature is 18.0°C and the atmospheric pressure is 100.3 kPa?

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3. Carbon dioxide gas can be removed from the air by bubbling it through LiOH(aq) solution. The reaction is as follows:



How many grams of lithium carbonate would form if 25.0 L of CO₂(g) were absorbed at 28.3 °C and 95.0 kPa?

4. A piece of zinc is dropped into a large volume of nitric acid, and 37.0 L of hydrogen gas form as a result.

(a) Write a balanced equation for the reaction between zinc and nitric acid.

(b) If the hydrogen was collected at 20.0 °C and 85.0 kPa, what mass of zinc reacted?