

Name: \_\_\_\_\_ per \_\_\_\_\_

## Gas Stoichiometry

### Practice Sheet #32

- Hydrogen is combined with oxygen to form water.
  - Write a balanced chemical equation for this reaction.
  - What volume and mass of hydrogen and oxygen (at STP) would be required to produce 27.0 g of water?
- Nitrogen monoxide reacts with oxygen to produce nitrogen dioxide.
  - Write a balanced chemical equation for this reaction.
  - If 140 L of oxygen react at STP, what volume of and mass of nitrogen monoxide is required? What volume and mass of nitrogen dioxide (at STP) would be produced?
  - If 15.0 g of nitrogen monoxide react, what volume of and mass of oxygen (at STP) is required? What volume and mass of nitrogen dioxide (at STP) would be produced?
- Nitrogen monoxide reacts with chlorine to form nitrosyl chloride (NOCl) at STP.
  - Write a balanced chemical equation for this reaction.
  - If 448 mL of nitrogen monoxide react with 336 mL of chlorine, which reactant is limiting and which is in excess?
  - What volume and mass of nitrosyl chloride will be produced (at STP)?

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4. Propyne ( $C_3H_4$ ) undergoes combustion with oxygen to produce carbon dioxide and water.
- Write a balanced chemical equation for this reaction.
  - If 52.0 L of propyne at 1.24 atm and 2870 °C, what volume and mass of oxygen is required?
  - What volume and mass of carbon dioxide water will be produced?
5. Carbon monoxide is combined with hydrogen to produce methanol ( $CH_3OH$ ) at  $5.25 \times 10^6$  Pa and 250 °C.
- Write a balanced chemical equation for this reaction.
  - If 450 mL of carbon monoxide react with 800 mL of hydrogen, which reactant is limiting and which is excess?
  - What volume and mass of methanol will be produced? If the percent yield for the reaction is 90.0 %, what mass of methanol will actually be produced?
6. Automobile air bags inflate following a serious impact. The impact triggers the chemical reactions:
- $$2 \text{NaN}_3 (\text{s}) \rightarrow 2 \text{Na}(\text{s}) + 3 \text{N}_2 (\text{g})$$
- If an automobile air bag has a volume of 11.8 L, how much  $\text{NaN}_3$  in grams is required to fully inflate the air bag upon impact? Assume STP conditions.