Unit VI. States of Matter. Assignment 9. Stoichiometry of Gases

Be sure to show all your work

1. Calculate the volume of O_2 , at 23.5°C and 753 mm Hg, needed to completely combust 125 g of octane (C_8H_{18}) to CO_2 and H_2O .

2. The first step in the process of making nitric acid, ammonia (NH_3) is reacted with oxygen (O_2) to produce nitric oxide (NO) and water.

- a. Write the balanced chemical equation:
- b. What volume of NO, measured at 1.00 atm and 1.00 x 10^{30} C, can be produced from 10.0 L of NH₃ and excess O₂ measured at the same temperature and pressure?
- c. What volume of O₂ measured at STP is consumed in reacting with 10.0 kg of NH₃
- d. What mass of NO is produced from the reaction of 5.00×10^2 L of NH₃, measured at 2.50×10^2 °C and 3.00 atm, with excess O₂
- e. What mass of H_2O is produced from the reaction of 65.0 L of NH_3 with 75.0 L of O_2 , both measured in STP?
- f. What would be the volume of the NO produced in 2d. if the temperature was decreased to 25.0 °C and the pressure increased to 15.00 atm?

Answers. 1. 336 L O₂ 2a. 4 NH₃ + 5 O₂ \rightarrow 4 NO + 6 H₂O 2b. 10.0 L NO 2c. 1.64 x 10⁴ L O₂ 2d. 1.05 x 10³ g 2e. 72.4 g H₂O 2f. 57.0 L NO