

The ideal gas questionnaire

[Environment](#), [Nature](#)



1. A sample of oxygen of mass 25.0 g is confined in a vessel at 0°C and 1000. torr. Then 6.00 g of hydrogen is pumped into the vessel at constant temperature. What will be the final pressure in the vessel (assuming only mixing with no reaction)?
2. A gaseous mixture contains 3.23 g of chloroform, CHCl_3 , and 1.22 g of methane, CH_4 . Assuming that both compounds remain as gases, what pressure is exerted by the mixture inside a 50.0-mL metal container at 275°C? What pressure is contributed by the CHCl_3 ?
3. A study of climbers who reached the summit of Mt. Everest without supplemental oxygen revealed that the partial pressures of O_2 and CO_2 in their lungs were 35 torrs and 7.5 torrs, respectively. The barometric pressure at the summit was 253 torr. Assume that the lung gases are saturated with moisture at a body temperature of 37°C. Calculate the partial pressure of inert gas (mostly nitrogen) in the climbers' lungs.
4. During a collision, automobile airbags are inflated by the N_2 gas formed by the explosive decomposition of sodium azide, NaN_3 . $2\text{NaN}_3 \rightarrow 2\text{Na} + 3\text{N}_2$. What mass of sodium azide would be needed to inflate a 25.0-L bag to a pressure of 1.40 atm at 25°C?
5. Calculate the volume of methane, CH_4 , measured at 300. K and 825 torr, that can be produced by the bacterial breakdown of 1.10 kg of simple sugar. $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 3\text{CH}_4 + 3\text{CO}_2$
6. We burn 12.50 L of ammonia in 20.00 L of oxygen at 00. °C. What volume of nitric oxide, NO , gas can form? What volume of steam, $\text{H}_2\text{O}(\text{g})$, is formed? Assume that all gases are at the same temperature

and pressure and that the limiting reactant is used up. $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$

7. A particular tank can safely hold gas up to a pressure of 44.3 atm. When the tank contains 38.1 g of N_2 at 25°C , the gas exerts a pressure of 10.1 atm. What is the highest temperature to which the gas sample can be heated safely?