

## Gas Law Problems: IV

1. A container holds 43.8 L of a chlorine gas at a temperature of 43°C and a pressure of 105 kPa. If  $R = 8.31 \text{ kPaL/mol K}$ , how many moles of chlorine gas are there?  
(1.75 mol)

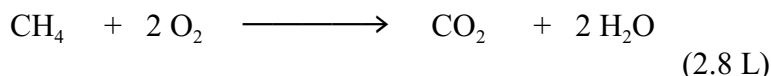
2. A syringe contains 30.0 mL of methane gas,  $\text{CH}_4$ , at a pressure of 105.0 kPa. The pressure is then reduced to 90.0 kPa, while the temperature remains constant. What is the new volume of the methane gas?  
(35 mL)

3. A rubber balloon contains 1.50 L of helium gas at a pressure of 100 kPa and a temperature of 22°C. Upon release the balloon rises to an altitude where the temperature is 4°C and the pressure of the helium is 60.0 kPa. What is the volume of the balloon at this altitude?  
(2.35 L)

4. Peroxyacetyl nitrate (PAN) produced in a chemical smog has a density of 1.85 g/L at 60 kPa and 112°C. Find its molar mass.  
(99  $\text{g mol}^{-1}$ )

5. Dimethyl sulfoxide has a mass composition of 30.7% C, 7.76% H, 41.1% S, 20.5% O. Its vapour has a density of 3.01 g/L at 151.99 kPa and 200°C. Calculate its molecular formula.  
(Molar mass = 78  $\text{g mol}^{-1}$ ,  $\text{C}_2\text{H}_6\text{SO}$ )

6. What volume of oxygen gas at STP is required for the complete combustion of 1.00 g of methane?



7. a) What is the pressure exerted by a mixture of 1.0g of hydrogen gas ( $\text{H}_2$ ) and 5.0 g of helium gas (He), when the mixture is confined to a volume of 5.0 L at 20°C?  
(852 L)

b) What are the partial pressures of the hydrogen and the helium in the gas mixture?  
(p (hydrogen) = 243 kPa)  
(p (helium) = 609 kPa)