Thermochemical equations – and PV = nRT
Lesson 9

1) Density is given as mass / volume
   a) Using the equation PV = nRT obtain an expression for the density of a gas.

   b) What is the density, in g / mL, of Cl_2 gas at 120.00 $^{\circ}$C and 1.00 atm pressure?

   c) The propane gas cylinder, shown on the right, was left outside at a temperature of 40.0 $^{\circ}$C. If the container was full of propane, as per label, what was the pressure exerted on the walls of the container by the propane gas if the cylinder has a volume of 9.00 litres? Assume all the propane is in the gaseous state.

2) a) Write a balanced thermochemical equation for the complete combustion of liquid octane.

   b) When an unknown amount of octane burns completely in excess oxygen 54.64 kJ of energy is released. What volume of carbon dioxide is produced at 100°C and at a pressure of 150.0 kpa?

   c) What mass of octane must undergo complete combustion in order to produce 4.00 X 10^{3} litres of carbon dioxide at 100°C and 1.20 atm pressure?

   d)   i. What amount of energy is released in, MJ, if octane burns in excess oxygen to produce 1.84 X 10^{4} litres of CO_2 gas at SLC.

        ii. Give the amount of energy produced in MJ per litre of CO_2 produced.