PV = nRT Ideal Gas Law Problems

Scientists call this mathematical relation the "Ideal Gas Law". It is called "ideal" because the formula assumes the size of the gas particles to be zero. That is, it assumes the gas molecules take up no volume. The volume above refers to the volume of the container.

For example, say we have a container whose volume is one litre. If we place a gas in this container, we say the volume of the gas is "one litre". Of course, this assumes that the gas particles in the container take up no space. In reality the particles do take up some space and thus the volume is not really one litre. Because of this, the formula does not give 'exact' results. Fortunately, however, the results for most applications are good enough.

1. Calculate the temperature, in ^{O}C, of 4.30 moles of a gas mixture which occupies a volume of 45.0 litres at a pressure of 105 kPa? (132 K)

2. Three moles of air occupy a volume of 15.0 litres at a temperature of -25°C. What is the pressure of this gas? (412.4 kPa)

3. How many moles of Cl_2 occupy a volume of 27.7 litres at a temperature of 43°C and a pressure of 110 kPa? (1.16 mol)

4. Calculate the pressure of a gas if 2.00 moles occupy a volume of 25.0 litres at 35°C. (204.9 kPa)

5. What volume is occupied by 0.0270 mol of a gas at 27.0°C and 101 kPa? (PV = nRT, R = 8.314 kPa ·l/K·mol) (0.667 L)

6. How many moles would be present in a 62.5 cm^3 sample of gas at 27.0°C and 107 kPa? (2.68×10^{-3} mol)

7. What volume is occupied by 0.250 g of O_2 measured at 20.0°C and 95.0 kPa? (0.224 L)

8. An electronic vacuum tube was sealed off during manufacture at a pressure of 1.6×10^{-6} kPa at 27.0°C. Its volume is 100 cm^3. How many gas molecules remain in the tube? (3.86×10^{13} molecules)