Exercise 1.49 – The equation of state

Q1409-01 Find the new volume of 22.4 dm^3 of ideal gas at STP if the pressure is changed to 202.6 kPa and the temperature is changed to 400K.

Q1409-02 100cm^3 of gas is collected in a syringe at room temperature (20ºC) and atmospheric pressure. What volume would this sample of gas occupy at STP?

Q1409-03 What temperature would 1dm^3 of gas at STP need to change volume to 2dm^3, under the same pressure conditions?

Q1409-04 Calculate the new pressure of a gas, if 22.4 dm^3 of gas at atmospheric pressure is heated to 1000 K in the same container.

Q1409-05 If the volume of a fixed mass of gas at 100ºC is 22.4 dm^3 and the pressure is 100.0 kPa, calculate the volume occupied by the gas at STP.

Q1409-06 The volume of a gas, measured at 27ºC and 101.3 kPa, is 20.0 dm^3. What temperature would be required to increase the volume to 40.0 dm^3 at a pressure of 202.6 kPa?

Q1409-07 A mass of ideal gas has a volume of 3.6 dm^3 at 20ºC and 101.3 kPa pressure. What pressure is required to compress it to 1.60 dm^3 at the same temperature?

Q1409-08 An ideal gas occupies 400 cm^3 at 300 K and 120kPa pressure. What temperature would be needed for it occupy 500 cm^3 under a pressure of 200 kPa?

Q1409-09 A gas cylinder can support a gas pressure of up to 6.20 x 10^4 kPa without exploding. If the pressure of the gas in the cylinder is 4 x 10^4 kPa at 25ºC, at what temperature would the cylinder rupture?

Q1409-10 A hot air balloon measures 60 m^3 at sea level, under a pressure of 101 kPa when the temperature of the air inside the balloon is 75ºC. As the balloon rises, the pressure falls to 80 kPa and the temperature of the air in the balloon falls to 50ºC. What is the new volume of the balloon?