Name _____ Date _____

Worksheet 5.1: Ideal gas calculations

All the questions on this worksheet can be done without a calculator.

STP = standard temperature and pressure, RTP = room temperature and pressure, molar volume of an ideal gas at STP = 22.7 dm^3 mol^{-1}, molar volume of an ideal gas at RTP = 24 dm^3 mol^{-1}, Avogadro constant = 6.02×10^{23} mol^{-1}, 1 bar = 100000 Pa.

Give your answers to three significant figures if they are non-divisible.

1 Convert the following units:

a 856.85°C to K _____

b 81 K to °C _____

c 67 kPa to Pa _____

d 0.35 bar to kPa _____

e standard pressure (as in STP) in bar _____

2 Calculate the number of particles in the following questions:

a the number of NO molecules in 4.8 cm^3 of nitrogen monoxide at RTP

_____

_____

b the number of Ar atoms in 113.5 dm^3 of argon at STP

_____

_____

c the number of molecules in 40 m^3 of an ideal gas at RTP

_____

_____

d the number of nitrogen and oxygen molecules together in 84 cm^3 of their mixture at RTP

_____

_____

e the number of gas molecules in 113.5 cm^3 of methane at STP

_____

_____

3 Apply the combined ideal gas law equation to complete the table, assuming that the amount of gas does not change. Units must be included in your answers.

Gas	P_1	V_1	T_1	P_2	V_2	T_2
A	100 kPa	50 cm^3	26.85°C	100 kPa	?	126.85°C
B	3.5×10^4 Pa	250 cm^3	19.85°C	?	200 cm^3	312.85°C
C	0.5 bar	15 dm^3	450 K	0.75 bar	10 dm^3	?
D	1 atm	50 m^3	200 K	?	100 cm^3	250 K
E	1.8×10^5 Pa	2.5×10^{-2} dm^3	−23.15°C	5×10^5 Pa	1.2×10^{-2} dm^3	?