Answer on Question #42380 - Chemistry - Inorganic Chemistry

Question:
A sample of argon has a pressure of 175 kPa when its temperature is 77 $^\circ$C. If its temperature is increased to 154 $^\circ$C and the volume is held constant, what is the new pressure?

Solution:
It is given that
$p_1 = 175$ kPa,
$V_1 = V_2$,
$T_1 = 77\ ^\circ$C = 350 K
$T_2 = 154\ ^\circ$C = 427 K
$p_2 = ?$
According to the combined gas law or general gas equation
$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$$
Hence, substituting the given values
$$p_2 = \frac{p_1 V_1 T_2}{T_1 V_2} = \frac{p_1 T_2}{T_1} = \frac{175 \cdot 427}{350} = 213.5\ kPa$$

Answer: 213.5 kPa