A pressurized can of shaving cream contains a gas under and internal pressure of 788torr at 25 degrees Celsius. The can itself is able to withstand an internal pressure of 3.00atm before it explodes. What temperature, in degrees Celsius, is needed to elevate the internal pressure within the can to its maximum value?

Solution:

According to Amontons' Law: the pressure of a gas of fixed mass and fixed volume is directly proportional to the gas' absolute temperature. It means that $\frac{P_1}{T_1} = \frac{P_2}{T_2}$. In our case P_1 = 788 torr, T_1 = 25° C, $P_2 = P_{max}$ = 3 atm. $T_{\max} = T_2 = \frac{P_2 T_1}{P_1} = \frac{3atm \cdot 25^oC}{788torr / 760torr} = \frac{3atm \cdot 25^oC}{1{,}037atm} = 72{,}3^oC$.

Answer: T_{max} = 72,3° C