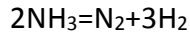


Answer to Question #50814, Chemistry, Physical Chemistry

AT 27 DEGREE TEMPERATURE AND 16.5 ATM PRESSURE NH₃ IS IN A CLOSED POT. AT 327 DEGREE TEMPERATURE IT PARTIALLY DISSOCIATES. AT EQUILIBRIUM THE PRESSURE INCREASED AT 45.5 ATM. HOW MUCH NH₃ DISSOCIATES TO REACH EQUILIBRIUM.
 $2\text{NH}_3 = \text{N}_2 + 3\text{H}_2$ THE ANS IS 37.8787% BUT HOW?

Solution:



$$\begin{aligned} pV &= nRT \\ V &= \text{const} \\ \frac{nRT}{p} &= \text{const} \\ \frac{n_1RT_1}{p_1} &= \frac{n_2RT_2}{p_2} \\ \frac{n_1T_1}{p_1} &= \frac{n_2T_2}{p_2} \\ \frac{n_1}{p_1} &= \frac{T_2n_2}{p_2T_1} \end{aligned}$$

If dissociates x parts of ammonia, then was formed $0.5x$ of N_2 and $1.5x$ of H_2 . Difference in pressure will be:

$$\begin{aligned} \frac{1}{1-x+1.5x+0.5x} &= \frac{T_2p_1}{p_2T_1} \\ \frac{1}{1+x} &= \frac{T_2p_1}{p_2T_1} \\ \frac{1}{1+x} &= \frac{(327+273) \times 16.5}{(27+273) \times 45.5} = \frac{600 \times 16.5}{300 \times 45.5} = \frac{9900}{13650} = 0.725274 \\ \frac{1}{1+x} &= 0.725274 \\ 1+x &= 1.378787 \\ x &= 0.378787 \end{aligned}$$

Answer:

37.8787 %