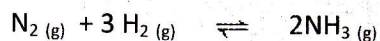
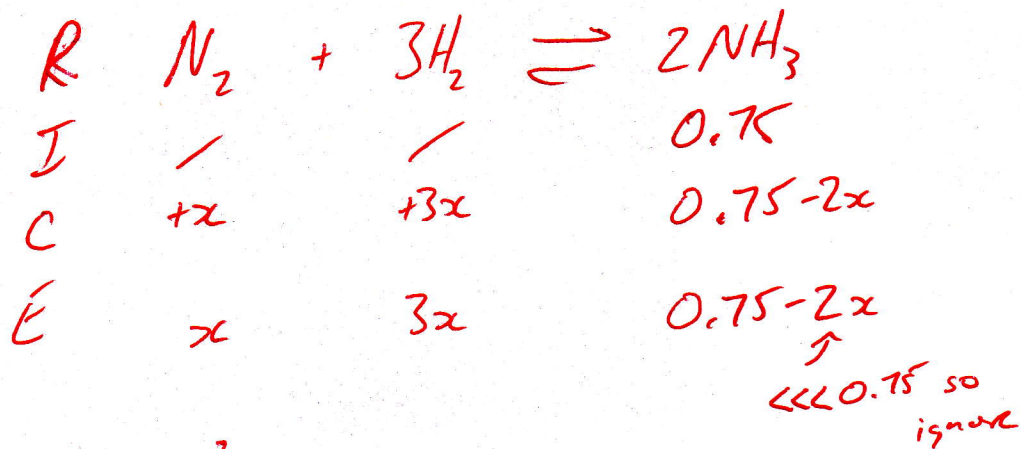


5) A chemist is studying the Haber process of Ammonia production.



If 1.5 moles of Ammonia are placed in a 2.0 L flask and allowed to come to equilibrium at 27 °C, what will the concentration of Nitrogen and Hydrogen be? (K_{eq} at 27 °C is 2.69×10^8)

**** assume that $x \ll [\text{NH}_3]$ and can be ignored to avoid the quadratic****



$$K_{eq} = \frac{[\text{NH}_3]^2}{[\text{H}_2]^3 [\text{N}_2]}$$

$$2.69 \times 10^8 = \frac{[0.75]^2}{[3]^3 [x]}$$

$$2.69 \times 10^8 = \frac{0.5625}{27x^4}$$

$$27x^4 = \frac{0.5625}{2.69 \times 10^8}$$

$$x = 0.00296$$

$$3x = 0.00889$$

$$\text{N}_2 = 0.0030 \frac{\text{mol}}{\text{L}}$$

$$\text{H}_2 = 0.0089 \frac{\text{mol}}{\text{L}}$$