

IF, at EQ, $[\text{CH}_4] = 0.50\text{M}$, $[\text{H}_2\text{O}] = 0.40\text{M}$,
 $[\text{CO}] = 0.60\text{M}$, what is $[\text{H}_2]$?

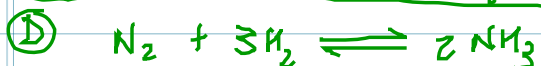
$$K = \frac{[\text{CO}][\text{H}_2]^3}{[\text{CH}_4][\text{H}_2\text{O}]}$$

$$[\text{H}_2]^3 = \frac{K[\text{CH}_4][\text{H}_2\text{O}]}{[\text{CO}]}$$

$$= \frac{(5.67)(0.50)(0.40)}{0.60}$$

$$\sqrt[3]{[\text{H}_2]^3} = \sqrt[3]{1.89}$$

$$[\text{H}_2] = 1.24\text{M}$$



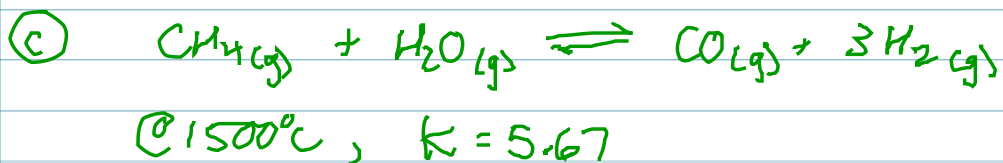
0.10 mol N_2 and 0.10 mol H_2 are mixed in an empty ~~at~~ 2.0L container. At EQ,
 $[\text{N}_2] = 0.035\text{M}$. What is K ?

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

$\frac{\text{mol}}{\text{M/L}}$

	$[\text{N}_2]$	$[\text{H}_2]$	$[\text{NH}_3]$
[initial]	0.050	0.050	0.0
$\Delta[\]$	-0.015	-0.045	+0.030
[EQ]	0.035	0.005	0.030

$$K = \frac{(0.030)^2}{(0.035)(0.005)^3} = 2.06 \times 10^5$$



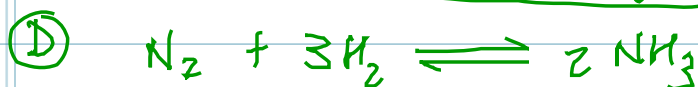
IF, at EQ, $[\text{CH}_4] = 0.50\text{M}$, $[\text{H}_2\text{O}] = 0.40\text{M}$,
 $[\text{CO}] = 0.60\text{M}$, what is $[\text{H}_2]$?

$$K = \frac{[\text{CO}][\text{H}_2]^3}{[\text{CH}_4][\text{H}_2\text{O}]} \quad [\text{H}_2]^3 = \frac{K[\text{CH}_4][\text{H}_2\text{O}]}{[\text{CO}]}$$

$$= \frac{(5.67)(0.50)(0.40)}{0.60}$$

$$\sqrt[3]{[\text{H}_2]^3} = \sqrt[3]{1.89}$$

$$[\text{H}_2] \approx 1.24\text{M}$$



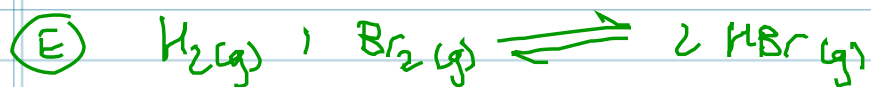
0.10 mol N_2 and 0.10 mol H_2 are united in an
 empty ~~2.0L~~ 2.0L container. At EQ,
 $[\text{N}_2] = 0.035\text{M}$. What is K ?

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

mol
 M/L

	$[\text{N}_2]$	$[\text{H}_2]$	$[\text{NH}_3]$
[initial]	0.050	0.050	0.0
ΔC	-0.015	-0.045	+0.030
[EQ]	0.035	0.005	0.030

$$K = \frac{(0.030)^2}{(0.035)(0.005)^3} = 2.06 \times 10^5$$



110g of HBr is added to an empty 5.0L container at constant T. If, at EQ, it is found there are 0.182g of H_2 , what is K at this T?

	H_2	Br_2	HBr
[initial]	0	0	0.272
ΔC	+0.018	+0.018	-0.036
EQ]	0.018	0.018	0.236

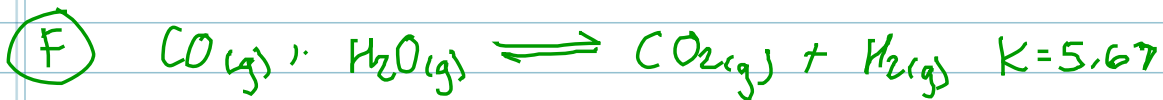
$$110\text{g HBr} \times \frac{1 \text{ mol}}{80.91\text{g}} = 1.36 \text{ mol}$$

$$\frac{1.36 \text{ mol}}{5.0\text{L}} = [\text{HBr}] = 0.272\text{M}$$

$$K = \frac{[0.236]^2}{(0.018)(0.018)} = 172$$

$$0.182\text{g} \times \frac{1 \text{ mol}}{2.02\text{g}} = 0.09 \text{ mol}$$

$$\frac{0.09 \text{ mol}}{5.0\text{L}} = 0.018\text{M}$$



0.10 mol CO and 0.10 mol H₂O are placed in an empty 2.0 L flask. What are all the EQ []'s?

	CO	H ₂ O	CO ₂	H ₂
[initial]	0.05	0.05	0.0	0.0
Δ []	-x	-x	+x	+x
[EQ]	0.05-x	0.05-x	x	x

$$K = \frac{[\text{CO}_2][\text{H}_2]}{[\text{CO}][\text{H}_2\text{O}]}$$

$$5.67 = \frac{(x)(x)}{(0.05-x)(0.05-x)}$$

$$5.67 = \frac{x^2}{0.0025 - 0.10x + x^2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x^2 = 5.67x^2 - 0.567x + 0.0142$$

$$0 = \underbrace{4.67}_{a}x^2 - \underbrace{0.567}_{b}x + \underbrace{0.0142}_{c}$$

[CO] = [H₂O] = 0.016 M
[CO₂] = [H₂] = 0.034 M

$$x = \frac{0.0829}{2} = 0.0395$$

$$\sqrt{5.67} = \sqrt{\frac{x^2}{(0.05-x)^2}}$$

$$2.38 = \frac{x}{0.05-x}$$

$$x = 0.119 - 2.38x$$

$$x = 0.035$$