

Eq 5 Equilibrium Calculations (ICE) ①

* For the reaction: $\text{H}_2(\text{g}) + \text{CO}_2(\text{g}) \rightleftharpoons \text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g})$
 at 700K, $K_c = 0.534$. Calculate the number of moles of $\text{H}_2(\text{g})$ at eq. when 0.300 mol of each of CO and H_2O are added in a 1L container.

$$\frac{0.300 \text{ mol}}{1 \text{ L}} = 0.300 \frac{\text{mol}}{\text{L}}$$

	$\text{H}_2(\text{g})$	$+$	$\text{CO}_2(\text{g})$	\rightleftharpoons	$\text{H}_2\text{O}(\text{g})$	$+$	$\text{CO}(\text{g})$	
I. (initial)	0		0		0.300M		0.300M	←
C (change)	+x		+x		-x		-x	←
E (eq. conc)	x		x		(0.300-x)		(0.300-x)	

$$K_c = \frac{[\text{H}_2\text{O}][\text{CO}]}{[\text{H}_2][\text{CO}_2]} = \frac{(0.300-x)(0.300-x)}{(x)(x)}$$

$$0.534 = \frac{(0.300-x)^2}{x^2} \quad \leftarrow *$$

√ of all of the above left & right.

$$\sqrt{0.534} = \sqrt{\frac{(0.300-x)^2}{x^2}}$$

$$0.7308 = \frac{0.300-x}{x}$$

$$1.7308x = 0.300$$

$$x = \boxed{0.173 \text{ M}}$$

↑
 $[\text{H}_2]$ and $[\text{CO}_2]$

Increase!!
 $(0.300-x)$
 $(0.300-0.173)$
 Not required here.