

ASSUMPTIONS WITH EQUILIBRIUM

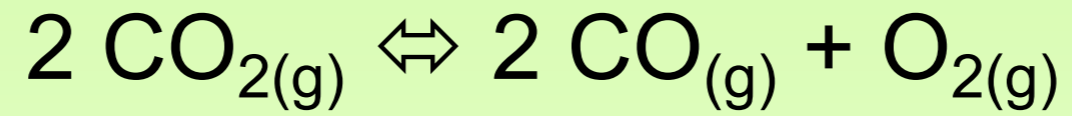
ASSUMPTIONS WITH EQUILIBRIUM

Example #1

At 2000°C, K_{eq} is 6.40×10^{-7} for the decomposition of CO_2 into CO and O_2 . Calculate all equilibrium concentrations if 0.250 mol of CO_2 is placed in a 1.00 L container at the given temperature.

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Example #1



I
C
E

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Look at the K_{eq} (which is 0.000000640)

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Example #1



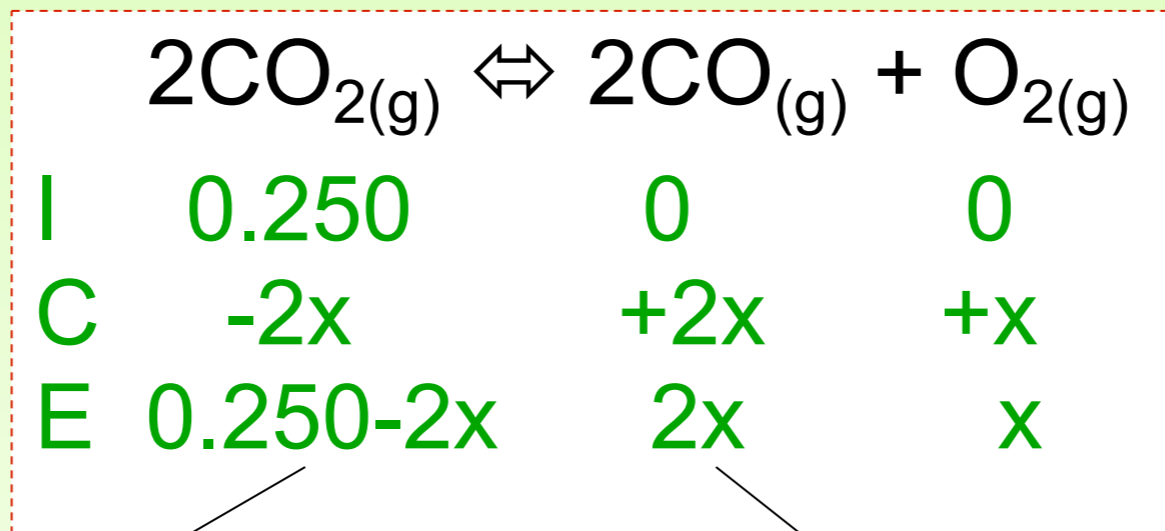
$$K_{\text{eq}} = \frac{[\text{CO}]^2[\text{O}_2]}{[\text{CO}_2]^2}$$
$$6.40 \times 10^{-7} = \frac{[2x]^2[x]}{[0.250 - 2x]^2}$$

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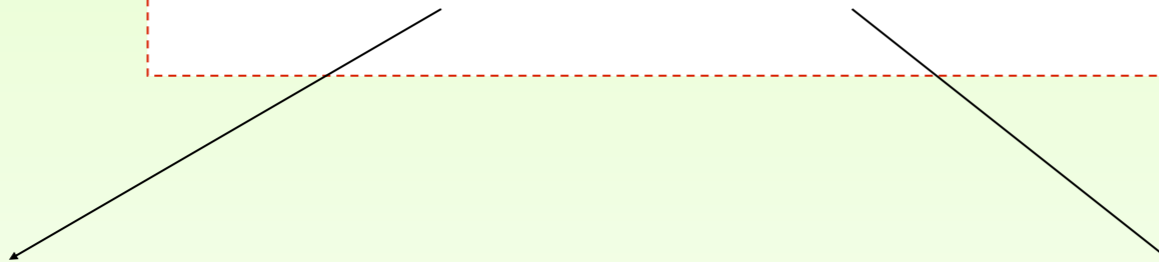
Example #1

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$$x = 2.15 \times 10^{-3}$$



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How do I know if I can make an assumption?

**You can also divide the initial concentration by k_{eq} .
If the answer is AT LEAST 100, you can use the
assumption!**

$0.250/6.40 \times 10^{-7} = 3.91 \times 10^5$, which is **MUCH** bigger than
100

0.247 and 0.250 are very close

The difference is 1.2%. As long as the difference is less
than 5%, you can use the assumption.

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Questions involving a lot of polynomial expansion is a good indication that an assumption should be used.

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In a study of halogen bond strengths, 0.50 mol of I_2 was heated in a 2.5L vessel, and the following reaction occurred: $I_2(g) \leftrightarrow 2I(g)$

Calculate $[I_2]$ and $[I]$ at equilibrium at 600K where $K_{eq} = 2.94 \times 10^{-10}$