Equilibrium Quiz **Name:** Key

May I post your solution? [ ] Yes [ ] No [ ] Yes, but redact my name

Consider the reaction: **$2NOCl\ (g) \rightleftharpoons 2NO\ (g) + Cl_2\ (g)$**

At 35 °C, the equilibrium constant is $K_c = 1.6 \times 10^{-5}$. In an experiment, you place 1.0 mol of NO (g) and 1.0 mol of Cl_2 (g) into a 2.0 L container and allow the system to reach equilibrium.

Set up an ICE chart and an expression that would allow you to calculate the equilibrium concentration of NO (g).

First, write down the expression for the equilibrium constant based on the stoichiometry:

$$K_c = \frac{[NO]^2[Cl_2]}{[NOCl]^2} = 1.6 \times 10^{-5}$$

Because we are only starting with NO and Cl_2, our equilibrium will shift to the left in order to reach equilibrium.

Now, we can set up our ICE chart as follows. Note that our chart is in units of M, so we need to convert from moles and volume given to concentration.

	2NOCl (g)	⇌	2NO (g)	+	Cl_2 (g)
I	0		0.50		0.50
C	+ 2x		– 2x		– x
E	2x		0.50 – 2x		0.50 – x

Therefore, the equilibrium concentrations can be solved using the expression for K_c above.

$$K_c = \frac{[NO]^2[Cl_2]}{[NOCl]^2}$$

$$1.6 \times 10^{-5} = \frac{(0.50 - 2x)^2(0.50 - x)}{(2x)^2}$$

Simplify the expression and solve for the value of x.

The equilibrium concentration of NO will then be:

$$[NO]_{eq} = 0.50 - 2x$$