

Exercise 7

Calculation~system not at equilibrium

A system was charged with NOCl gas until its concentration reached 0.400 mol L⁻¹. The temperature of the system was then increased to 245°C and it was allowed to reach equilibrium according to equation. At equilibrium, the concentration of Cl₂ was 0.0225 mol L⁻¹. Calculate the value of K_c at this temperature

At T = 0s
0.40 mol/L NOCl(g)

**Answer:**

	$2\text{NOCl(g)} \rightleftharpoons \text{Cl}_2\text{(g)} + 2\text{NO(g)}$		
[] initial			
[] change			
[] at equilibrium			

Given info:

$$K_c = \frac{[\text{Cl}_2][\text{NO}]^2}{[\text{NOCl}]^2}$$

$$[\text{Cl}_2]_{\text{eq}} = 0.0225 \text{ mol/L}$$

At equilibrium,

$$[\text{Cl}_2] \text{ is } 0.0225 \text{ mol/L} = x$$

$$[\text{NOCl}] = 0.400 - 2x$$

$$= \text{ } \text{ mol/L}$$

$$[\text{NO}] = 2x$$

$$= \text{ } \text{ mol/L}$$

Substitute the value of [] at equilibrium in the K_c formula

$$K_c = \frac{[]^{\square} []^{\square}}{[]^{\square} []^{\square}}$$

$$= \square$$