Question #61567 – Chemistry – Organic Chemistry

Question

1. What is the concentration of NO gas at equilibrium if you mix 0.20 mol of N2 and 0.15 mol of O2 in a 1.0 L container at 2000 °C? The Kc for the reaction at 2000 °C is .
N2 + O2 -> 2NO

Solution

Solution is difficult because K_c is not given by customer.

$K_C=[NO]^2/([N_2][O_2])$

If x mol of N2 react with O2

$K_c=[2x]^2/[0.2-x][0.15-x]$

$(K_C-4)*x^2-0.35K_Cx+K_C*0.03=0$

$x=(4-K_C+(0.35^2-4(K_C-4)*K_C*0.03)^{0.5})/(2(K_C-4))$ – typical solution of quadratic equation

$[NO]=2x=2*(4-K_C+(0.35^2-4(K_C-4)*K_C*0.03)^{0.5})/(2(K_C-4))$

Answer: $[NO]= 2*(4-K_C+(0.35^2-4(K_C-4)*K_C*0.03)^{0.5})/(2(K_C-4))$

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