Eq ③ K_c and K_p Calculations.

① Write K_p expressions for the following equations.

(a) $PCl_{3(g)} + Cl_{2(g)} \rightleftharpoons PCl_{5(g)}$ $\quad K_p = \dfrac{(P_{PCl_5})}{(P_{PCl_3})(P_{Cl_2})}$

(b) $O_{2(g)} + 2H_{2(g)} \rightleftharpoons 2H_2O_{(g)}$ $\quad K_p = \dfrac{1}{(P_{O_2})(P_{H_2})^2}$

$K_p = K_c (RT)^{\Delta n}$

Δn = products − reactants

$PV = nRT$ $\quad P = \dfrac{(n)}{(V)}RT$ → molarity

gas const. $\quad$ temp (K!) $\quad$ K_c

② What is the K_p of $N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$ $\quad K_c = 4.63 \times 10^{-3}$ @ 25°C

$T = 25 + 273 = 298$ $\quad \Delta n = 2 - 1 = 1$

$K_p = K_c (RT)^{\Delta n} = 4.63 \times 10^{-3} (0.0821 \times 298)^1$

$= \boxed{0.113}$

③ Calculate K_p of $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ $\quad K_c = 2.3 \times 10^{-3}$ @ 375°C

$T = 375 + 273 = 648$, $\quad \Delta n = 2 - 4 = -2$

$K_p = K_c (RT)^{\Delta n} = \dfrac{2.3 \times 10^{-2}}{(0.0821 \times 648)^2}$

$= \boxed{8.13 \times 10^{-6}}$ $\quad \dfrac{1}{(\ )^2}$