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Kuis ini saya kerjakan dengan sejujur-jujurnya.

6.) knowns :

equilibrium constant of $K_c = 1,2$ at $375°C$
starting consentration $[H_2]_0 = 0,76 M$, $[N_2]_0 = 0,60 M$, $[NH_3]_0 = 0,48 M$

asked :

which species will increase and decrease in concentration at equilibrium

$$N_2(g) + 3H_2(g) \rightleftarrows 2NH_3(g)$$

calculations :

$$Q = \frac{[NH_3]^2}{[N_2][H_2]^3} = \frac{(0,48)^2}{(0,60)(0,76)^3} = 0,87$$

$Q < K_c$

! If $Q < K$, the reaction will proceed forward so the concentration of reactants will decrease and that product will increase

Result :

$[N_2]$ and $[H_2]$ will decrease
$[NH_3]$ will increase

3.) knowns :

reversible decomposition of solid ammonium carbamate at 40°
total gas pressure is 0,363 atm.

$$NH_4CO_2NH_2(\ ) \rightleftarrows 2NH_3(g) + CO_2(g)$$

asked :

calculate the equilibrium constant K_p

calculations :

$$K_p = (P_{NH_3})^2 (CO_2)$$

Equilibrium of P_{NH_3} is $0 + 2x$
Equilibrium of P_{CO_2} is $x + 0$

so, $P_{NH_3} + P_{CO_2} = 0,363$
$2x + x = 0,363$
$x = 0,121$

$P_{NH_3} = 2x = 0,242$ atm
$P_{CO_2} = x = 0,121$ atm

$$K_p = (P_{NH_3})^2 (P_{CO_2}) = (0,242)^2 (0,121) = 7,09 \times 10^{-3}$$

Result :

$K_p = 7,09 \times 10^{-3}$

5.) knowns :

equilibrium constant $K_P = 5.60 \times 10^4$ at 350 °C

initial pressure of SO_2 is 0,350 atm, O_2 is 0,762 atm.

$2SO_2(g) + O_2(g) \rightleftarrows 2SO_3(g)$

asked :

Whether the pressure at equilibrium will be greater than or less than the initial pressure (1,112 atm) ?

calculations :

	SO_2	O_2	SO_3
initial	0,350	0,762	0
change	$-2x$	$-x$	$+2x$
Equilibrium	$0,350-2x$	$0,762-x$	$2x$

total pressure :

$P_{total} = (0,350 - 2x) + (0,762 - x) + 2x$

$P_{total} = 1,112 - x$

Result :

Equilibrium pressure must be less than 1,112 atm

4.) knowns :

2,50 mol NOCl in a 1,50 L at 400 °C

after equilibrium, 28 % NOCl is dissociated.

$2NOCl(g) \rightleftarrows 2NO(g) + Cl_2(g)$

asked :

Find the equilibrium constant K_c

calculations :

Molarity of NOCl,

$[NOCl] = \frac{2.50 \text{ mol}}{1,5 L} = 1,667 M$

	[NOCl]	[NO]	[Cl_2]
Initial	1,667	0	0
change	$-2x$	$+2x$	$+x$
Equilibrium	$1,667-2x$	$2x$	x

28 % NOCl dissociated

$[NOCl]_0 - [NOCl]_{equil} = 0,28[NOCl]_0$

$2x = 0,28(1,667) \Leftrightarrow x = 0,2334$

From the value x,

$$K_p = \frac{[NO]^2 [Cl_2]}{[NOCl]^2} = \frac{(2x)^2 (x)}{(1,667 - 2x)^2}$$

$$K_p = \frac{[2(0.2334)]^2 (0,2334)}{[1,667 - 2(0,2334)]^2} = 0,0353$$

Result :

$K_p = 0,0353$

2.) Knowns :

$K_p = 1.8 \times 10^{-5}$ at $350\,°C$ for

$$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$$

Asked :

$K_c = ?$

Calculations :

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

$$R = 0,0821 \frac{L.atm}{mol.K}$$

T = absolute temp in K

Δn_g = Σn gaseous product $-$ Σn gaseous reactants

$\Delta n_g = (2+1) - 2 = 1$

$$K_c = \frac{K_p}{(RT)^{\Delta n_g}} = \frac{1.8 \times 10^{-5}}{[(0,0821)(350+273)]^1} = 3,5 \times 10^{-7}$$

Result :

at $350\,°C$, $K_c = 3,5 \times 10^{-7}$

1.) Asked :

a.) largest equilibrium constant ?

b.) smallest equilibrium constant ?

Calculation :

$K_p = K_c [RT]^{\Delta n}$ → RT is same, Δn too.

$K_p = K_c$

$$K_{p_1} = \frac{[AB]^2}{[B]^2 [A]^2} \Rightarrow A + B \leftrightarrow AB$$

$$K_{p_2} = \frac{[AC]^3}{[A][C]} \Rightarrow A + C \rightleftharpoons 3AC$$

$$K_{p_3} = \frac{[AD]}{[A]^3 [D]^3} \Rightarrow 3A + 3D \rightleftharpoons AD$$

Result :

a.) K_{p_2} is the largest

b.) K_{p_3} is the smallest.