Nishant Jindal

V = 10 lit

$H_2(g) + I_2(g) \longrightarrow 2HI(g)$ $K_c = 4$

2 4

$0.2 - x$ $0.4 - x$ $2x$

$$4 = \frac{4(2x)^2}{(0.2-x)(0.4-x)}$$

$$0.08 + x^2 - 0.6x = x^2$$

$$x = \frac{0.08}{0.6} = \frac{8}{60} = \frac{2}{15}$$

$0.2 - \frac{2}{15}$ $\frac{4}{15}$ $\frac{4}{15}$

$\frac{1}{15}$

V = 10 lit

$H_{2(g)} + I_2(g) \rightarrow 2HI(g)$ $K_c = 2$

2 4

$0.2 - x$ $0.4 - x$ $2x$

$$\frac{(2x)^2 2x^2}{(0.2-x)(0.4-x)} = 2$$

$$2x^2 = 0.08 + x^2 - 0.6x$$

$$x^2 + 0.6x - 8 \times 10^{-2} = 0$$

$$x = \frac{-0.6 + \sqrt{36 \times 10^{-2} + 4 \times 8 \times 10^{-2}}}{2}$$

$$= \frac{-6 \times 10^{-1} + \sqrt{68} \times 10^{-1}}{2} = \frac{(8.25 - 6) \times 10^{-1}}{2}$$

$$x = 1.125 \times 10^{-1}$$

Case - I

Q. $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$ $\quad K_c = 10^{-5}\ M$

$\frac{10^{-5}}{0.1} = 10^{-4}$

$V = 10$ lit

	1 mol	0	0
	$0.1 - x$	x	x

$$10^{-5} = \frac{x^2}{0.1 - x}$$

$\frac{10^{-3}}{0.1} \times 100 = 1\%$

$$x^2 + 10^{-5}x - 10^{-6} = 0$$

$$x = \frac{-10^{-5} + \sqrt{10^{-10} + 4 \times 10^{-6}}}{2} = \frac{-10^{-5} + 2 \times 10^{-3}}{2}$$

$$= \frac{-10^{-5} + 200 \times 10^{-5}}{2}$$

$$= \frac{199 \times 10^{-5}}{2} = 99.5 \times 10^{-5}$$

$$= 0.995 \times 10^{-3} \simeq 10^{-3}$$

$10^{-5} = \frac{x^2}{0.1 - x}$ $\quad 0.1$ $\quad 10^{-3}$

$x^2 = 0.1 \times 10^{-5} = 10^{-6}$

$x = 10^{-3}$

If $\frac{K_c}{[\text{initial conc}] = c} \leq 10^{-3}$

then x can be neglected wrt C

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Q.

$V = 10^5$ Lit

$A(g)$	$\rightarrow$	$B(g)$	+	$C(g)$
1 mol		0		0
10^{-5}		0		0
$10^{-5} - x$		x		x

$K_c = 10^{-5}$

$\sqrt{5} = 2.23$

$\simeq 2.24$

$$\frac{K_c}{C} = \frac{10^{-5}}{10^{-5}} = 1 > 10^{-3}$$

$$10^{-5} = \frac{x^2}{10^{-5} - x}$$

$x = 10^{-5}$

$$10^{-5} = \frac{x^2}{10^{-5} - x}$$

$$x^2 + 10^{-5}x - 10^{-10} = 0$$

$$x = \frac{-10^{-5} + \sqrt{10^{-10} + 4 \times 10^{-10}}}{2}$$

$$x = \frac{\sqrt{5} - 1}{2} \times 10^{-5} = 0.62 \times 10^{-5}$$

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eq16m

0-I — 15

5-I — 10

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	8.24
8	68
8	64
162	400
2	324
1644	7600
4	6576
1648	

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(8) $O_3 + O_2$ — 1 lit at STP

$$O_3 \longrightarrow O_2 + O^{2-}$$

($n_f = 2$)

$$KI \longrightarrow I_2$$

eq of O_3 = eq of hypo

$$\frac{n_{O_3}}{1000} \times 2 = \frac{40 \times 1/10}{1000} \times 1$$

$$n_{O_2} = 2 \times 10^{-3}$$

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(13) Fe_3O_4 & Fe_2O_3

x y

$\downarrow KI$

$Fe^{2+} + (I_2 + \text{hypo}$

eq of Fe_3O_4 + eq of Fe_2O_3 = eq of I_2 = eq of hypo

$\frac{20}{100}(2x + 2y) = 11 \times 0.5 \times 1$

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(15) $H_2O_2 + KMnO_4 \longrightarrow O_2 + Mn^{2+}$

$n_f = 5$

$20 \times M \times 2 = \frac{M_{KMnO_4} \times 20 \times 5}{2}$

$\longrightarrow$ $n_f = 3$

$KMnO_4 + MnSO_4 \longrightarrow MnO_2$ $\quad \frac{2\times3}{5} = \frac{6}{5} = n_f$

$1\text{M} \quad 20 \times M_{KMnO_4} \times 3 = 2 \text{ mmoles} \times \frac{6}{5}$

$M_{KMnO_4} = \frac{1}{25}$

$MnO_2 + Na_2C_2O_4 \longrightarrow Mn^{2+} + CO_2$

$n_f = 2$

$10 \times 0.2 \times 2$

$= 4 \text{ meq}$

4 meq

2 mmol

10
13
15