



$$K = \frac{1}{[\text{O}_2]^3}$$

$$[\text{O}_2] = \frac{1.0 \times 10^{-3} \text{ mol}}{2.0 \text{ L}} = 5.0 \times 10^{-4} \text{ M}$$

$$K = \frac{1}{(5.0 \times 10^{-4})^3} = 8.0 \times 10^9$$



$$K = \frac{[\text{HOCl}]^2}{[\text{H}_2\text{O}][\text{Cl}_2\text{O}]} = 0.0900$$

$$a) \quad Q = \frac{(1.0)^2}{(2.10)(0.10)} = 1.0 \times 10^2$$

$$Q > K$$

←

$$b) \quad Q = \frac{\left(\frac{0.084 \text{ mol}}{2.0 \text{ L}}\right)^2}{\left(\frac{0.08 \text{ mol}}{2.0 \text{ L}}\right)\left(\frac{0.080 \text{ mol}}{2.0 \text{ L}}\right)} = 0.0900$$

$$Q = K$$

@ equilibrium

$$c) \quad Q = \frac{\left(\frac{0.25 \text{ mol}}{3.0 \text{ L}}\right)^2}{\left(\frac{0.56 \text{ mol}}{3.0 \text{ L}}\right)\left(\frac{0.0010 \text{ mol}}{3.0 \text{ L}}\right)} = 110$$

$$Q > K$$

←



$$K = \frac{[\text{H}_2]^2 [\text{O}_2]}{[\text{H}_2\text{O}]^2}$$

$$2.4 \times 10^{-3} = \frac{(1.4 \times 10^{-2})^2 [\text{O}_2]}{(0.11)^2} \quad [\text{O}_2] = 0.080 \text{ M}$$



$$K = \frac{[\text{SO}_3][\text{NO}]}{[\text{SO}_2][\text{NO}_2]}$$

$$[\text{SO}_3]_0 = [\text{NO}]_0 = 0$$

$$[\text{SO}_2]_0 = [\text{NO}_2]_0 = \frac{2.00 \text{ mol}}{1.00 \text{ L}} = 2.00 \text{ M}$$

$$[\text{NO}] = \frac{1.30 \text{ mol}}{1.00 \text{ L}} = 1.30 \text{ M}$$

	SO_2	NO_2	SO_3	NO
I	2.00	2.00	0	0
C	-1.30	-1.30	+1.30	+1.30
E	0.70	0.70	1.30	1.30

$$K = \frac{(1.30)(1.30)}{(0.70)(0.70)} = 3.4$$

$$47) \quad [\text{SO}_3]_0 = \frac{12.0 \text{ mol}}{3.0 \text{ L}} = 4.0 \text{ M}$$

$$[\text{SO}_2]_{0g} = \frac{3.0 \text{ mol}}{3.0 \text{ L}} = 1.0 \text{ M}$$



$$K = \frac{[\text{SO}_2]^2 [\text{O}_2]}{[\text{SO}_3]^2}$$

	SO_3	SO_2	O_2
I	4.0	0	0
C	-1.0	+1.0	+0.5
E	3.0	1.0	0.5

$$K = \frac{(1.0)^2 (0.5)}{(3.0)^2} = 0.056$$



$$K = \frac{[\text{NH}_3]^2}{[\text{H}_2]^3 [\text{N}_2]}$$

	H_2	N_2	NH_3
I	11.0	10.0	0
C	-6.0	-2.0	+4.0
E	5.0	8.0	4.0



$$K = \frac{[\text{SO}_3][\text{NO}]}{[\text{SO}_2][\text{NO}_2]} = 3.75$$

$$Q = 1$$

	SO_2	NO_2	SO_3	NO	$Q < K$ →
I	0.800	0.800	0.800	0.800	
C	-x	-x	+x	+x	
E	0.800-x	0.800-x	0.800+x	0.800+x	

$$\sqrt{\frac{(0.800+x)^2}{(0.800-x)^2}} = \sqrt{3.75}$$

$$\frac{0.800+x}{0.800-x} = 1.94$$

$$0.800+x = 1.55 - 1.94x$$

$$2.94x = 0.75$$

$$x = 0.26$$

$$[\text{SO}_3] = [\text{NO}] = 0.800 + 0.26 = 1.06 \text{ M}$$

$$[\text{SO}_2] = [\text{NO}_2] = 0.800 - 0.26 = 0.54 \text{ M}$$