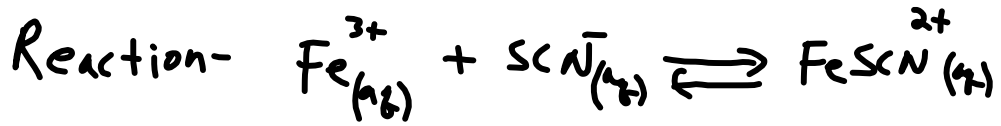


Equilibrium Constant

Lab Activity Calculations



I. Initial $[Fe^{3+}]$

a) Well D3 (standard)

$$[Fe^{3+}] = 0.200 \times \frac{5}{10} = 0.100 \text{ mol/L}$$

b) Well A1

$0.200 \times \frac{4}{10} = 0.08 \text{ M}$

$0.080 \text{ M} \times \frac{5}{10} = 0.040 \text{ mol/L}$

c) Well A2

$0.080 \text{ M} \times \frac{4}{10} = 0.032 \text{ M}$

Well = $0.032 \times \frac{5}{10} = 0.016 \text{ M}$

d)

Well A3 = $0.016 \times \frac{4}{10} = 0.0064 \text{ M}$

e)

Well A4 = $0.0064 \times \frac{4}{10} = 0.00256 \text{ mol/L}$

Calculations Continued

2. Initial $[\text{SCN}^-]$

$$0.200 \times \frac{5}{10} = \boxed{0.100 \text{ M}}$$

3. Find equilibrium $[\text{FeSCN}^{2+}]$

D3

Standard

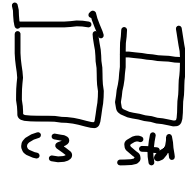
I.C.E. chart

	Fe^{3+}	$+$	SCN^-	\rightleftharpoons	FeSCN^{2+}
I	0.100		0.001		0
C	-0.001		-0.001		0.001
E			0		0.001

assume SCN^-
is all used

4. Find $[FeSCN^{2+}]$ in wells.

$$\underline{C3} \quad [] = 0.001 \times \frac{8}{10} = 0.0008 \text{ M}$$



$$\underline{D4} \quad [] = 0.001 \times \frac{6}{10} = 0.0006 \text{ M}$$

$$\underline{E3} \quad = 0.001 \times \frac{5}{10} = 0.0005 \text{ M}$$

$$\underline{D2} \quad = 0.001 \times \frac{4}{10} = 0.0004 \text{ M}$$

4. Find all concentrations

Well C3

	Fe^{3+}	SCN^-	$FeSCN^{2+}$
I	0.040	0.0010	0
C	-0.0008	-0.0008	0.0008
E	0.0392	0.0002	0.0008

Well D4

Well E3

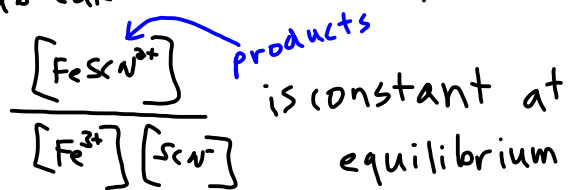
Well D2

Analysis Questions - Find a pattern using equilibrium

$$\frac{[FeSCN^{2+}]}{[Fe^{3+}] + [SCN^-]} \quad \frac{[Fe^{3+}][FeSCN^{2+}]}{[SCN^-]} \quad \frac{[FeSCN^{2+}]}{[Fe^{3+}][SCN^-]}$$

Mass Action Expression

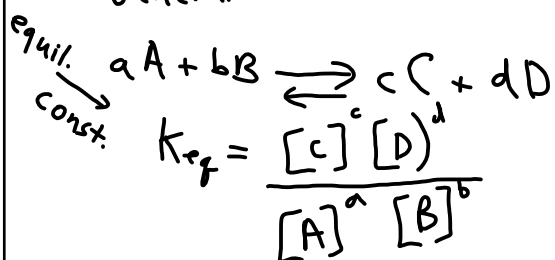
Lab calculations we find



↑
↑
reactants

Mass Action Expression

General-



Examples -

1. Write a mass action expression
for $\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2\text{NO}_2(\text{g})$

$$K_{eq} = \frac{[\text{NO}_2]^2}{[\text{N}_2\text{O}_4]}$$

at equilibrium

2. $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$

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

For heterogeneous equilibrium
Substances in liquid or solid state
are not included in the expression.

Questions P. 497 #1-5