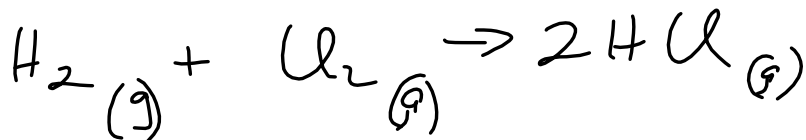


19/587



$$\begin{aligned}\Delta G^\circ &= [2 \cdot (\Delta G_{\text{HCl}})] - [(\Delta G_{\text{H}_2}) + (\Delta G_{\text{Cl}_2})] \\ &= [2(-95.27)] - [0 + 0]\end{aligned}$$

$$\Delta G^\circ = -190.54 \text{ kJ}$$

Mar 21-7:25 AM

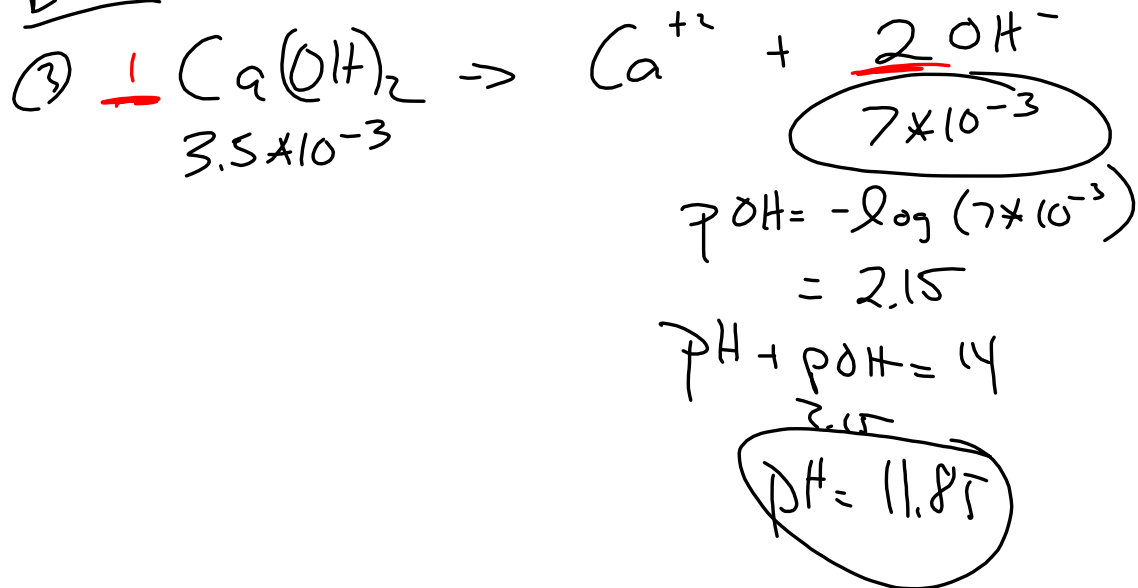
19/65

$$\Delta G = \Delta H - T\Delta S$$

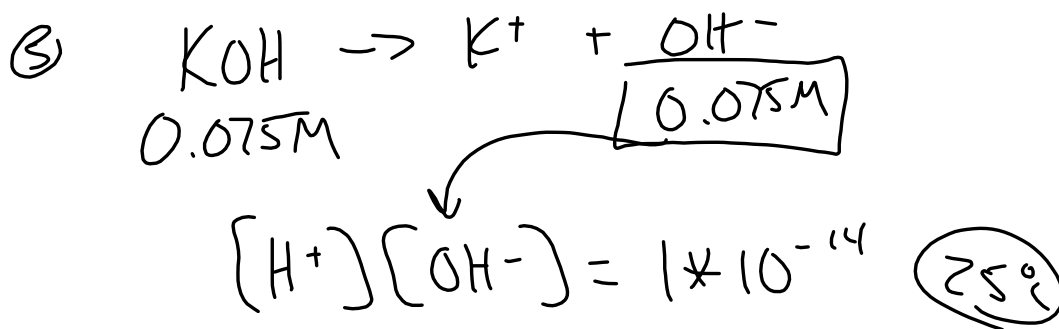
$$0 = -32 - T(-0.098)$$

$$T = 326.5 \text{ K}$$

Mar 21-7:45 AM

E2

Mar 21-7:53 AM



Mar 21-7:56 AM

⑥

	NO_2^-	$+ \text{H}_2\text{O}$	\rightleftharpoons	HNO_2	$+ \text{OH}^-$
I	0.5M			x	x
Δ	-x			+x	+x
E	0.5-x			x	x

$K_b = \frac{x^2}{0.5} = 2.22 \times 10^{-11}$
 $x = 3.33 \times 10^{-6} \text{ (OH}^-)$
 $K_a \times K_b = K_w$
 $\text{pOH} = 5.48$
 $\text{pH} = 8.52$

Mar 21-7:58 AM

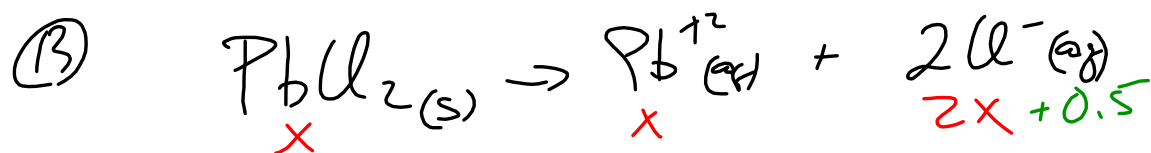
⑫

$$\text{Mg(OH)}_2(s) \rightleftharpoons \text{Mg}^{+2}(aq) + 2\text{OH}^-(aq)$$

$$K_{sp} = [\text{Mg}^{+2}] [\text{OH}^-]^2$$

$$Q = (x) (2x)^2$$

Mar 21-8:06 AM



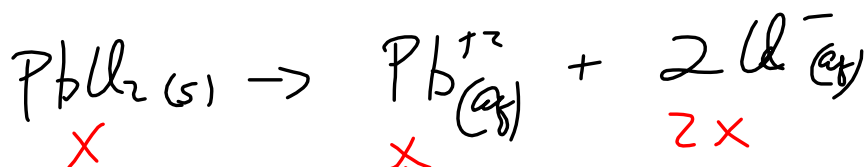
$$K_{sp} = [\text{Pb}^{+2}] [\text{Cl}^-]^2 \quad \text{In } 0.5\text{M Cl}^-$$

$$1.6 \times 10^{-6} = x (0.5 + 2x)^2$$

$$1.6 \times 10^{-6} = 0.25x$$

$$6.4 \times 10^{-6} = x$$

Mar 21-8:08 AM



$$K_{sp} = [\text{Pb}^{+2}] [\text{Cl}^-]^2$$

$$? = (0.016) (0.032)^2$$

Mar 21-8:12 AM

(16) $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{HOH}$

① Next
Moles

	H^+	$+$	OH^-	\rightleftharpoons	HOH
I	0.0013		0.0016		
D	-0.0013		-0.0013		
E			0.0003		

② Recalc
M

$15.3 \times 10^{-3} \text{ M} = 0.01686 \text{ M}$
 $\text{pOH} = 1.77$
 $\text{pH} = 12.23$

OH⁻

Mar 21-8:14 AM

(17) $\text{HA} \rightleftharpoons \text{H}^+ + \text{A}^-$

Mar 21-8:17 AM

② $HF + OH^- \rightarrow F^- + H_2O$

① Net	I 0.0075	0.005		
Moles	D -0.005	-0.005	+0.005	
	F 0.0025		0.005	

② Reak
M

0.082 \rightarrow 0.03125M

0.080 \rightarrow 0.0625M

pH = $-\log(6.8 \times 10^{-4}) + \log \frac{0.0625}{0.03125} = 3.468$

Mar 21-8:19 AM

② $Fe(IO_3)_3 \rightleftharpoons Fe^{+3} + 3 IO_3^-$

$K_{sp} = [Fe^{+3}] [IO_3^-]^3$

WUT $Q_{sp} = (1 \times 10^{-4}) (1 \times 10^{-5})^3$

$Q_{sp} = 1 \times 10^{-19} < 1 \times 10^{-14} K$

Mar 21-8:24 AM

$$K_w = [H^+] [OH^-] = 4 \times 10^{-14} \quad (45^\circ C)$$

$$x = \sqrt{4 \times 10^{-14}}$$

$$= 2 \times 10^{-7}$$

$$pH = -\log H^+ = 6.7$$

Mar 21-8:26 AM

	$HX \rightarrow$	H^+	$+ X^-$
I	0.01	0	0
Δ	-x	+x	+x
E	0.01-x	x	x

$$K_a = \frac{x^2}{0.01-x} = \frac{(1 \times 10^{-4})^2}{1 \times 10^{-2}}$$

$pH = 4$
 $pH = -\log[H^+]$
 $-4 = \log H^+$
 $H^+ = 1 \times 10^{-4}$

Mar 21-8:28 AM

ΔG vs ΔG° ← Appendix C

Non-std Conditions vs STD Conditions

25°C, 1 atm

$\Delta G = \Delta G^\circ + RT \ln Q$

$\frac{[Prod]}{[React]}$ (check)

Not EQ

8.314 x 10⁻³ kJ/K

kJ

kJ

kJ

kJ

Mar 21-8:30 AM

$\Delta G = \Delta G^\circ + RT \ln Q$

NOT AT EQ

Suppose we ARE at EQ

AT EQ $Q = K$, $\Delta G = 0$

$0 = \Delta G^\circ + RT \ln K$

$\Delta G^\circ = -RT \ln K$ AT EQ

Mar 21-8:34 AM

$K > 1$ favors Products ΔG° ? Spont / Non Spont?

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G = - (8.314 \times 10^{-2}) (\oplus) \ln 2$$

$\Delta G = \ominus$ Spont!

Mar 21-8:37 AM

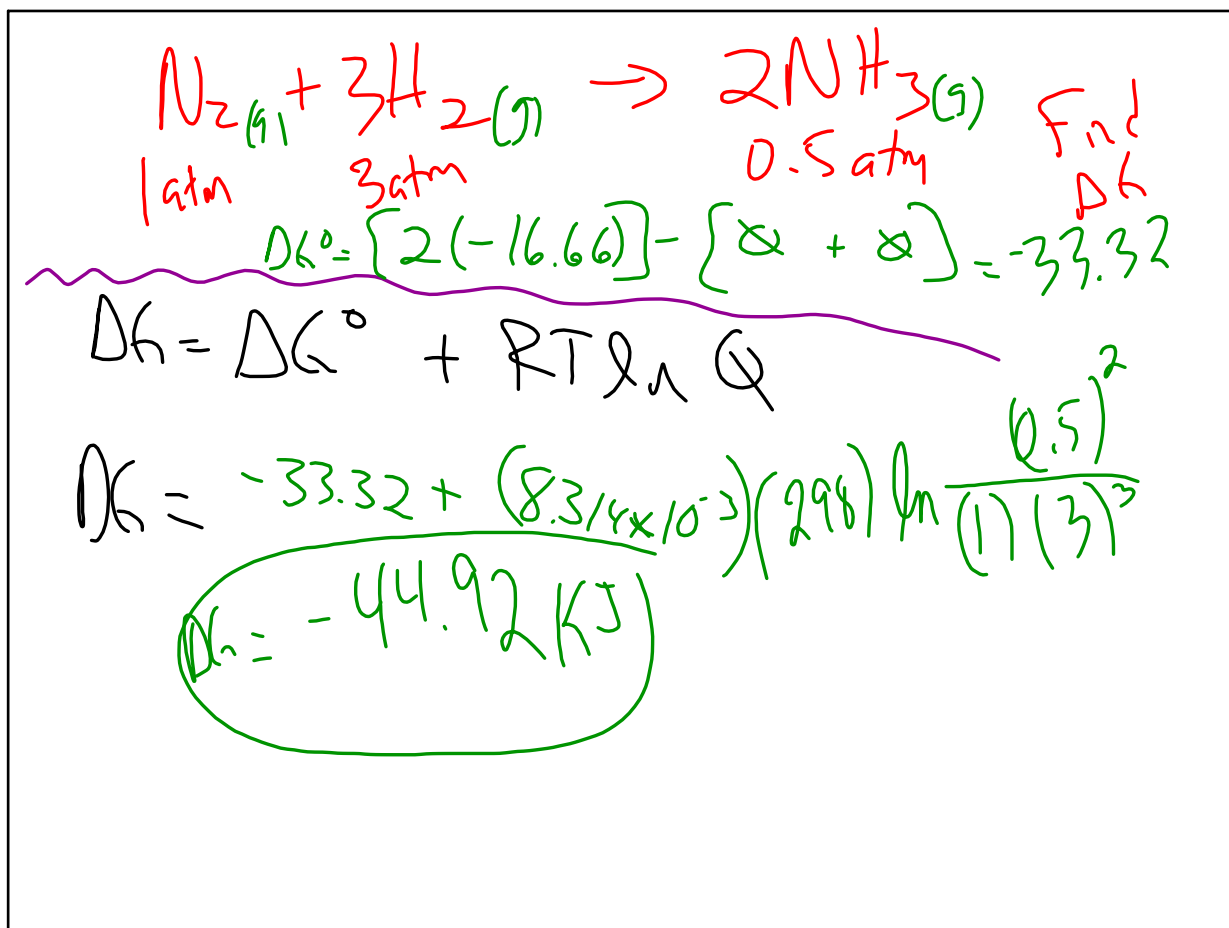
$K < 1$ favoring React Sign of ΔG°

$$\Delta G^\circ = -RT \ln K$$

$$= - (\oplus)(\oplus) \ln 0.1$$

$\Delta G = \oplus$

Mar 21-8:39 AM



Mar 21-8:41 AM

19 / 76, 78 a+b

Mar 21-8:46 AM