

(17.54) Calc Sol of LaF_3 in g/l
 (a) in pure water $K_{sp} = 2 \times 10^{-19}$

$\text{LaF}_3(s) \rightarrow \text{La}^{+3}(aq) + 3\text{F}^{-}(aq)$

M.RATIO \downarrow X X $3X$

$$K_{sp} = [\text{La}^{+3}][\text{F}^{-}]^3 = (X)(3X)^3 = 2 \times 10^{-19}$$

9.28×10^{-6} mole LaF_3	196 g LaF_3
l	mole LaF_3
1.8×10^{-3} g LaF_3 / l	l

$27X^4 = 2 \times 10^{-19}$
 $X = 9.28 \times 10^{-6} \text{ M}$
0.00000928
0.01

Mar 8-7:39 AM

$Q \rightarrow$ NOT AT EQUILIBRIUM

K_c, K_{eq}
 K_a, K_b, K_w
 K_{sp}

If $Q > K$

←

If $Q = K$ AT EQ

If $Q < K$

→

Mar 8-8:03 AM

(17.54) Sol LaF_3 in $0.01\text{M KF}_{(aq)}$

K_{sp} salt mostly insol

Sol salt
 $\text{KF} \rightarrow \text{K}^+ + \text{F}^-$
 $0.01\text{M} \quad 0.01\text{M} \quad 0.01\text{M}$
 M RATIO

Common ion

$\text{LaF}_3 \rightleftharpoons \text{La}^{3+} + 3\text{F}^-$

X X $3x + 0.01\text{M}$ IGNORE

$K_{sp} = [\text{La}^{3+}][\text{F}^-]^3 = 2 \times 10^{-19}$

(X) $(3x + 0.01)^3 = 2 \times 10^{-19}$

$x = 2 \times 10^{-13}\text{M}$

$2 \times 10^{-13}\text{Mole}$	196g	= $3.92 \times 10^{-11}\text{g/l}$
l	1Mole	

Mar 8-8:05 AM

④ LaF_3 in 0.05 LaCl_3 soln

$K_{sp} = 2 \times 10^{-19}$

$\text{LaF}_3 \rightarrow \text{La}^{3+} + 3\text{F}^-$

X X $3x$

$\text{LaCl}_3 \rightarrow \text{La}^{3+} + 3\text{Cl}^-$

$0.05\text{M} \quad 0.05\text{M} \quad 0.15\text{M}$

$K = [\text{La}][\text{F}^-]^3$

$= (0.05)(3x)^3 = 2 \times 10^{-19}$

$= 5.3 \times 10^{-7}\text{Mole}$

$1.04 \times 10^{-4}\text{g/l}$

Mar 8-8:17 AM

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

I	0.1	}	x	}	x
A	-x	}	+x	}	+x
E	0.1-x	}	x	}	x

$$K_a = \frac{(H^+)(X^-)}{(HX)} = \frac{(x)(x)}{0.1-x} = \frac{(1 \times 10^{-4})(1 \times 10^{-4})}{0.1 - \cancel{1 \times 10^{-4}}}$$

1×10^{-7}

Mar 8-8:23 AM

② 0.1 M NaOH ← SB

$[OH^-] = 0.1 M \leftarrow 1 \times 10^{-1}$

$[OH^-] = 1 \times 10^{-1}$ pOH = 1

$[H^+] = 1 \times 10^{-13}$ pH = 13

Mar 8-8:27 AM