SID ☐☐☐☐☐☐☐   Last *Key*   First *Answer*

Question 1 3 Points	**Rank** the following salts from **1-3** in order of **increasing solubility** with **1 being the most soluble** and **3 being the least soluble**.

- CaF_2 $K_{sp} = 3.9 \times 10^{-11}$ __1__ $S = 2.1 \times 10^{-4}$
- $NiCO_3$ $K_{sp} = 6.6 \times 10^{-9}$ __2__ $S = 8.1 \times 10^{-5}$
- Fe_2S_3 $K_{sp} = 1.4 \times 10^{-88}$ __3__ $S = 1.1 \times 10^{-18}$

Question 2 6 Points	The **maximum** amount of **zinc(II) phosphate** that will dissolve in a **0.140 M potassium phosphate** solution is: Zinc(II) phosphate: Ksp = 9.1×10^{-33}

	$Zn_3(PO_4)_2$	+	H_2O	⇌	$3 Zn^{2+}$	+	$2 PO_4^{3-}$
I	Some				0		0.14
C	-S				3S		2S
E					3S		0.14 + 2S

0.14 + 2S ≈ 0.14

$K_{sp} = [Zn^{2+}]^3 [PO_4^{3-}]^2$

$9.1 \times 10^{-33} = (3S)^3 (0.14)^2$

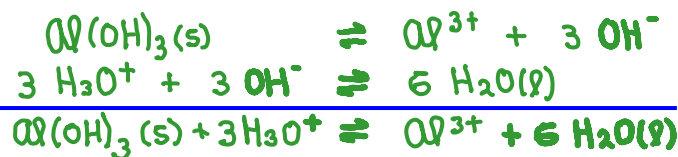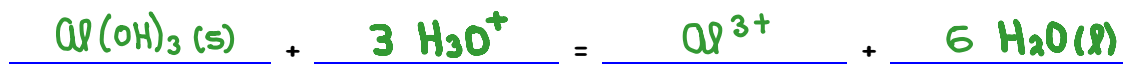$27S^3 = \dfrac{9.11 \times 10^{-33}}{(0.14)^2} = 4.64 \times 10^{-31}$

$S = 2.58 \times 10^{-11}$

__2.58×10^{-11}__ M

Question 3 7 Points	**Write a balanced net ionic equation** to show why the solubility of **Al(OH)₃(s) increases** in the **presence of a strong acid** and **calculate the equilibrium constant** for the reaction **of this sparingly soluble salt with acid.**

Must show work when calculating K – Ksp Al(OH)₃ = 1.9×10^{-33} ; Kw = 1×10^{-14}

__$Al(OH)_3 (s)$__ + __$3 H_3O^+$__ = __Al^{3+}__ + __$6 H_2O(l)$__

$Al(OH)_3 (s) \rightleftharpoons Al^{3+} + 3 OH^-$

$3 H_3O^+ + 3 OH^- \rightleftharpoons 6 H_2O(l)$

$\overline{Al(OH)_3 (s) + 3H_3O^+ \rightleftharpoons Al^{3+} + 6 H_2O(l)}$

$K_{sp} = 1.9 \times 10^{-33}$

$K = \left(\dfrac{1}{1 \times 10^{-14}}\right)^3$

$K = 1.9 \times 10^9$

K = __1.9×10^9__

Question 4 4 Points	**Rank** the following substances from **1-4** in order of **increasing entropy** with **1 being the lowest entropy** and **4 being the highest entropy.**

- $SnCl_4(l)$ __3__
- $SnCl_4(g)$ __4__
- $Sn(s)$ __1__
- $SnO_2(s)$ __2__