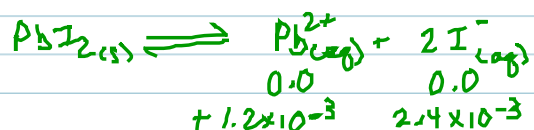


The molar solubility of  $\text{PbI}_2$  is  $1.2 \times 10^{-3} \text{ M}$ .  
What is the  $K_{sp}$  of  $\text{PbI}_2$ ?

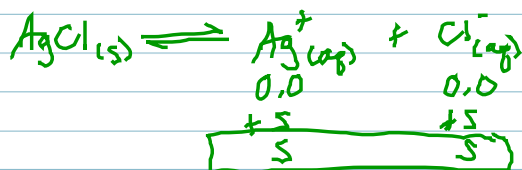


$$K_{sp} = [\text{Pb}^{2+}][\text{I}^{-}]^2 = (1.2 \times 10^{-3})(2.4 \times 10^{-3})^2$$

$$K_{sp} = 6.9 \times 10^{-9}$$


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The  $K_{sp}$  of  $\text{AgCl}$  is  $1.7 \times 10^{-10}$ . What is the molar solubility? What is the molarity of each ion?

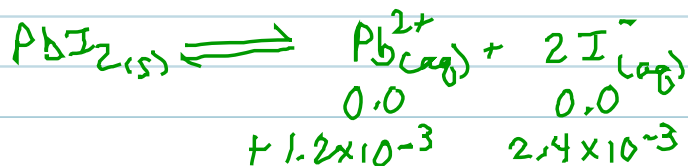


$$K_{sp} = [\text{Ag}^{+}][\text{Cl}^{-}] \quad \sqrt{1.7 \times 10^{-10}} = \sqrt{S^2}$$

$$S = 1.3 \times 10^{-5} \text{ M}$$

$$[\text{Ag}^{+}] = [\text{Cl}^{-}] = 1.3 \times 10^{-5} \text{ M}$$

The molar solubility of  $PbI_2$  is  $1.2 \times 10^{-3} M$ .  
What is the  $K_{sp}$  of  $PbI_2$ ?

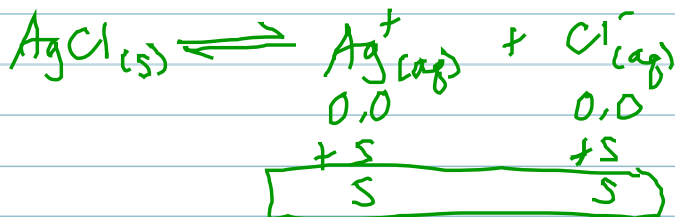


$$K_{sp} = [Pb^{2+}][I^{-}]^2 = (1.2 \times 10^{-3})(2.4 \times 10^{-3})^2$$

$$K_{sp} = 6.9 \times 10^{-9}$$

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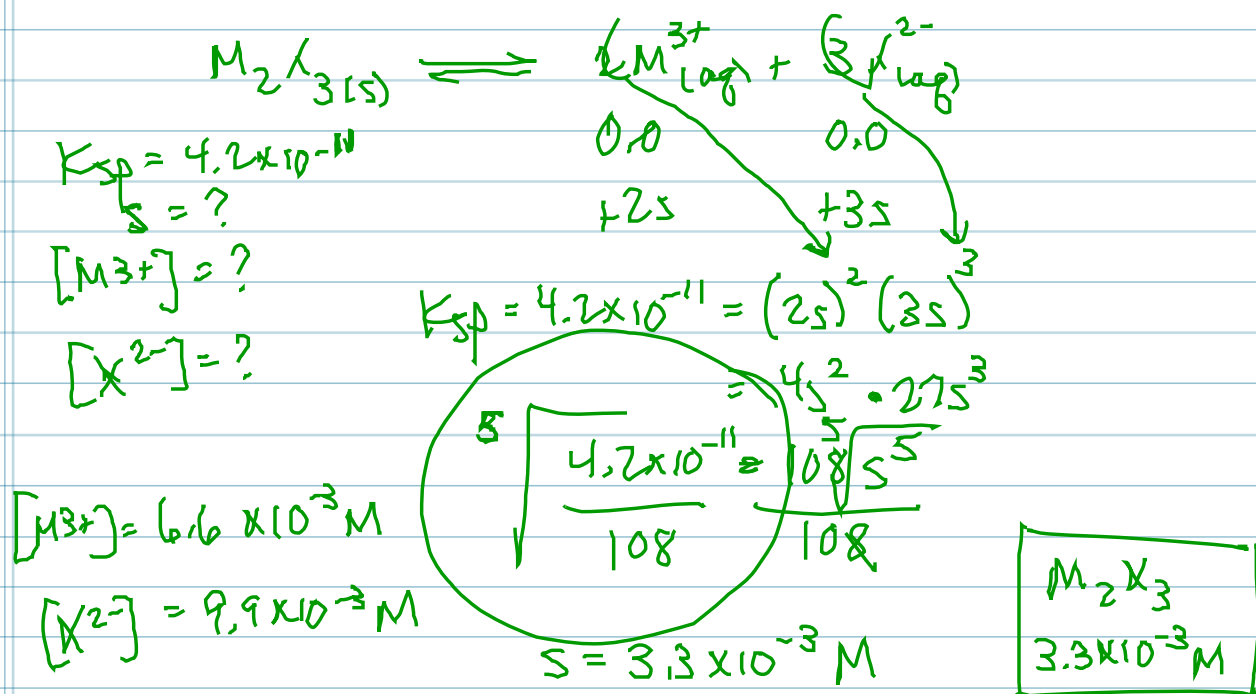
The  $K_{sp}$  of  $AgCl$  is  $1.7 \times 10^{-10}$ , what is the molar solubility? What is the molarity of each ion?



$$K_{sp} = [Ag^{+}][Cl^{-}] \quad \sqrt{1.7 \times 10^{-10}} = \sqrt{S^2}$$

$$S = 1.3 \times 10^{-5} M$$

$$[Ag^{+}] = [Cl^{-}] = 1.3 \times 10^{-5} M$$



$$(4.2 \times 10^{-11} \div 108) \wedge (1 \div 5)$$

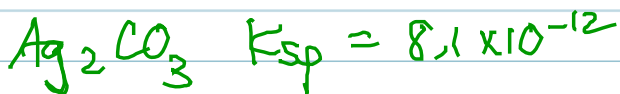
### MOLARITY OF IONS IN A SOLUTION

→ an aqueous ionic solution no longer exists as the compound

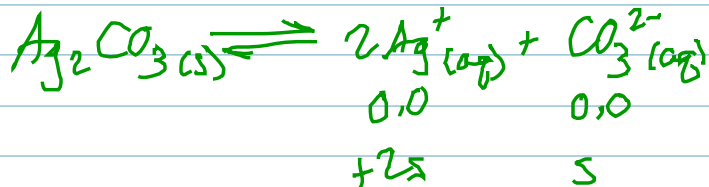
<div style="border: 1px solid black; padding: 2px; display: inline-block;">0.1M CuSO<sub>4</sub></div> <div style="margin-left: 10px;"> <math>[Cu^{2+}] = 0.1M</math>  <math>[SO_4^{2-}] = 0.1M</math> </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">0.1M Na<sub>3</sub>PO<sub>4</sub></div> <div style="margin-left: 10px;"> <math>[Na^+] = 0.3M</math>  <math>[PO_4^{3-}] = 0.1M</math> </div>
<div style="border: 1px solid black; padding: 2px; display: inline-block;">0.1M Co(NO<sub>3</sub>)<sub>2</sub></div> <div style="margin-left: 10px;"> <math>[Co^{2+}] = 0.1M</math>  <math>[NO_3^-] = 0.2M</math> </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">0.1M Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub></div> <div style="margin-left: 10px;"> <math>[Al^{3+}] = 0.2M</math>  <math>[SO_4^{2-}] = 0.3M</math> </div>

## COMMON ION EFFECT

Q: Will an ionic compound dissolve to a greater or lesser extent if there are already dissolved ions in the  $H_2O$ ?



a) What are the molar solubility and ion concentrations if  $Ag_2CO_3$  is dissolved in pure  $H_2O$ ?



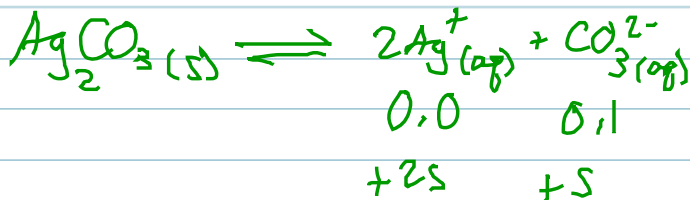
$$K_{sp} = [Ag^+]^2 [CO_3^{2-}]$$
$$\sqrt[3]{\frac{8,1 \times 10^{-12}}{4}} = (2s)^2 (s) = \sqrt[3]{4s^3}$$

$$s = 1,3 \times 10^{-4} M$$

$$[Ag^+] = 2,6 \times 10^{-4} M$$

$$[CO_3^{2-}] = 1,3 \times 10^{-4} M$$

b) What is "s" and  $[Ag^+]$  if I dissolve  $Ag_2CO_3$  into 0,1 M  $Na_2CO_3$ ?



$$K_{sp} = (2s)^2 (0,1)$$

$$\sqrt{\frac{8,1 \times 10^{-12}}{0,4}} = \frac{\sqrt{4s^2}}{0,4}$$

$$\approx 0,1$$

$$s = 4,5 \times 10^{-6} M ; [Ag^+] = 9,0 \times 10^{-6} M$$

in pure  $H_2O$

$$s = 1,3 \times 10^{-4} M \quad [Ag^+] = 2,6 \times 10^{-4} M$$