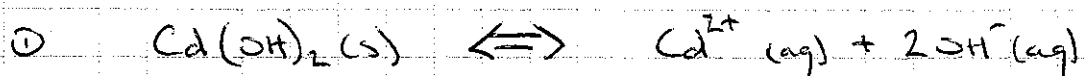


Finding and Using Solubility Products



$$[\text{OH}^{-}] = 2[\text{Cd}^{2+}]$$

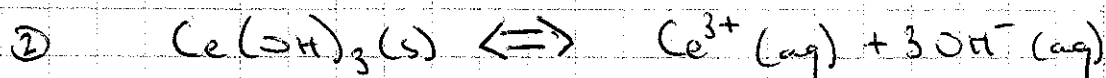
$$= 2(1.7 \times 10^{-5})$$

$$= 3.4 \times 10^{-5}$$

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

$$= (1.7 \times 10^{-5})(3.4 \times 10^{-5})^2$$

$$K_{\text{sp}} = \boxed{1.97 \times 10^{-14}}$$



$$[\text{OH}^{-}] = 3[\text{Ce}^{3+}]$$

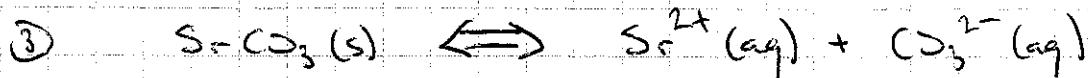
$$= 3(5.2 \times 10^{-6})$$

$$= 1.56 \times 10^{-5}$$

$$K_{\text{sp}} = [\text{Ce}^{3+}][\text{OH}^{-}]^3$$

$$= (5.2 \times 10^{-6})(1.56 \times 10^{-5})^3$$

$$K_{\text{sp}} = \boxed{1.97 \times 10^{-20}}$$

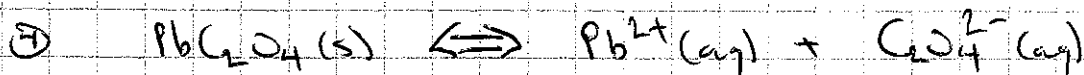


$$[\text{CO}_3^{2-}] = [\text{Sr}^{2+}] = 4.0 \times 10^{-5}$$

$$K_{\text{sp}} = [\text{Sr}^{2+}][\text{CO}_3^{2-}]$$

$$= (4 \times 10^{-5})(4 \times 10^{-5})$$

$$K_{\text{sp}} = \boxed{1.6 \times 10^{-9}}$$

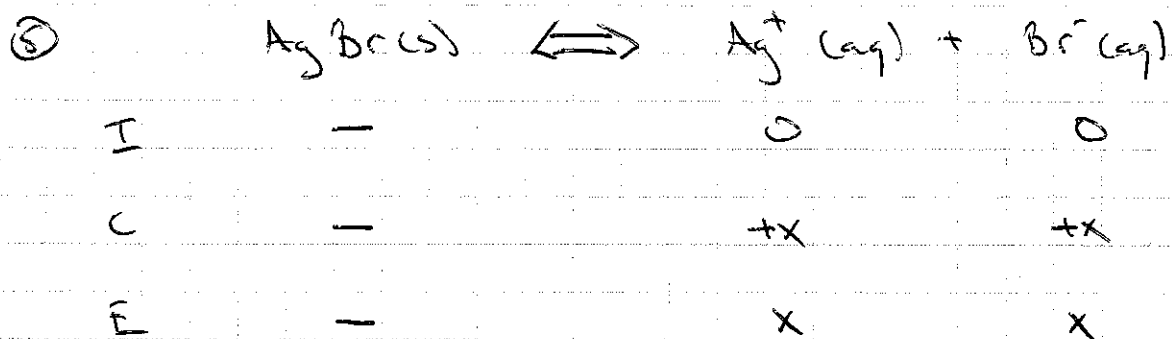


$$[\text{Cl}_2^{-}] = [\text{Pb}^{2+}] = 5.23 \times 10^{-6}$$

$$K_{\text{sp}} = [\text{Pb}^{2+}][\text{Cl}_2^{-}]$$

$$= (5.23 \times 10^{-6})(5.23 \times 10^{-6})$$

$$K_{\text{sp}} = \boxed{2.74 \times 10^{-11}}$$

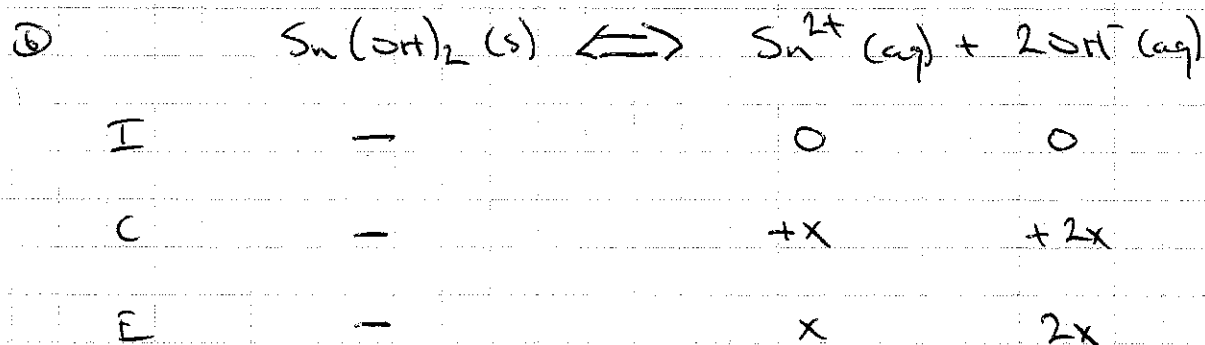


$$K_{sp} = [\text{Ag}^+][\text{Br}^-]$$

$$5.4 \times 10^{-13} = (x)(x)$$

$$x^2 = 5.4 \times 10^{-13}$$

$$x = \boxed{7.35 \times 10^{-7} \text{ mol/L}}$$



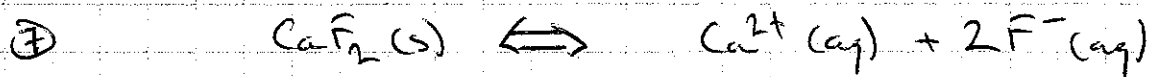
$$K_{sp} = [\text{Sn}^{2+}][\text{OH}^-]^2$$

$$1.4 \times 10^{-28} = (x)(2x)^2$$

$$4x^3 = 1.4 \times 10^{-28}$$

$$x^3 = 3.5 \times 10^{-29}$$

$$x = \boxed{3.27 \times 10^{-10} \text{ mol/L}}$$



I	-	0	0
C	-	+x	+2x
E	-	x	2x

$$K_{sp} = [\text{Ca}^{2+}][\text{F}^{-}]^2$$

$$3.9 \times 10^{-11} = (x)(2x)^2$$

$$4x^3 = 3.9 \times 10^{-11}$$

$$x^3 = 9.75 \times 10^{-12}$$

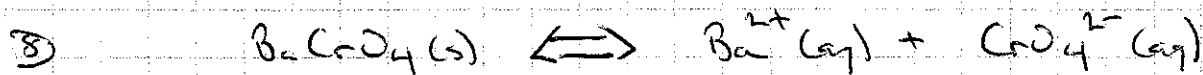
$$x = 2.14 \times 10^{-4}$$

$$[\text{Ca}^{2+}] = x = \boxed{2.14 \times 10^{-4} \text{ M}}$$

$$[\text{F}^{-}] = 2x$$

$$= 2(2.14 \times 10^{-4})$$

$$[\text{F}^{-}] = \boxed{4.27 \times 10^{-4} \text{ M}}$$



I	-	0	0
C	-	+x	+x
E	-	x	x

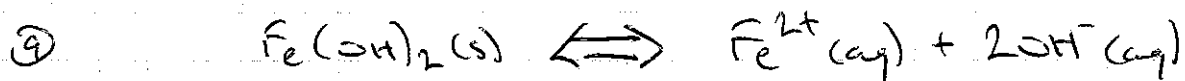
$$K_{sp} = [\text{Ba}^{2+}][\text{CrO}_4^{2-}]$$

$$1.2 \times 10^{-10} = (x)(x)$$

$$x^2 = 1.2 \times 10^{-10}$$

$$x = 1.1 \times 10^{-5} \text{ mol/L}$$

$$\# \text{ moles} = \boxed{1.1 \times 10^{-5}}$$



I	-	0	0
C	-	+x	+2x
E	-	x	2x

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

$$4.9 \times 10^{-17} = (x)(2x)^2$$

$$4x^3 = 4.9 \times 10^{-17}$$

$$x^3 = 1.225 \times 10^{-17}$$

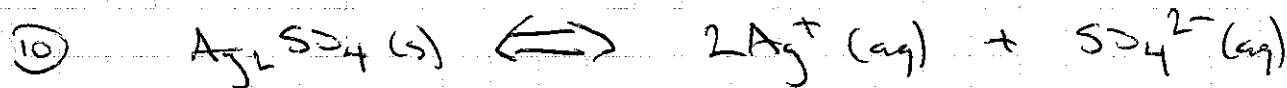
$$x = 2.31 \times 10^{-6}$$

$$[\text{Fe}^{2+}] = x = \boxed{2.31 \times 10^{-6} \text{ M}}$$

$$[\text{OH}^{-}] = 2x$$

$$= 2(2.31 \times 10^{-6})$$

$$[\text{OH}^{-}] = \boxed{4.61 \times 10^{-6} \text{ M}}$$



I	-	0	0
C	-	+2x	+x
E	-	2x	x

$$K_{sp} = [\text{Ag}^{+}]^2[\text{SO}_4^{2-}]$$

$$1.2 \times 10^{-5} = (2x)^2(x)$$

$$4x^3 = 1.2 \times 10^{-5}$$

$$x^3 = 3.0 \times 10^{-6}$$

$$x = 0.014$$

$$[\text{Ag}^{+}] = 2x$$

$$= 2(0.014)$$

$$[\text{Ag}^{+}] = \boxed{0.029 \text{ M}}$$

$$[\text{SO}_4^{2-}] = x = \boxed{0.014 \text{ M}}$$