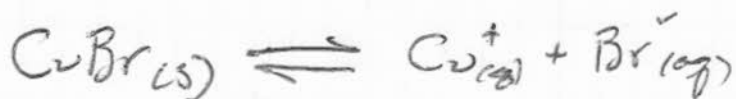


Chapter 6

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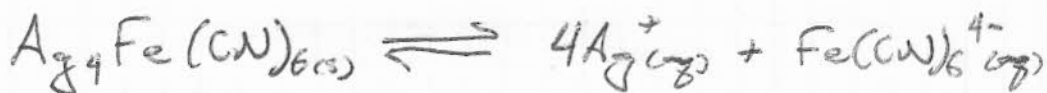


$$[\text{Cu}^+][\text{Br}^-] = 5 \times 10^{-9}$$

$$x(0.10) = 5 \times 10^{-9}$$

$$x = \boxed{5 \times 10^{-8} \text{ M} = [\text{Cu}^+]}$$

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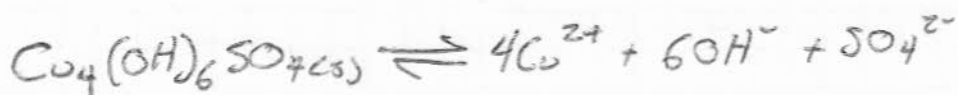


$$[\text{Ag}^+]^4 [\text{Fe}(\text{CN})_6^{4-}] = 8.5 \times 10^{-45}$$

$$(1.0 \times 10^{-6})^4 (x) = 8.5 \times 10^{-45}$$

$$x = 8.5 \times 10^{-21} \text{ M} = [\text{Fe}(\text{CN})_6^{4-}] = \boxed{8.5 \text{ nM}}$$

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$$[\text{SO}_4^{2-}][\text{OH}^-]^6 [\text{Cu}^{2+}]^4 = 2.3 \times 10^{-67}$$

$$4\text{Cu}^{2+} = \text{SO}_4^{2-} \Rightarrow [\text{Cu}^{2+}] = 4[\text{SO}_4^{2-}]$$

$$[\text{SO}_4^{2-}][\text{OH}^-]^6 (4[\text{SO}_4^{2-}])^4 = 2.3 \times 10^{-67}$$

$$x(1.0 \times 10^{-6})^6 [4x]^4 = 2.3 \times 10^{-67}$$

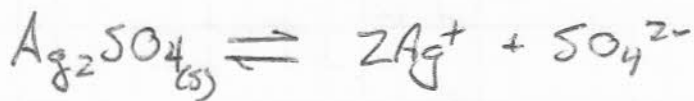
$$x^5 (2.56 \times 10^{-34}) = 2.3 \times 10^{-67}$$

$$x = 9.8 \times 10^{-8} = [\text{SO}_4^{2-}]$$

$$[\text{Cu}^{2+}] = 4(9.8 \times 10^{-8}) = \boxed{3.9 \times 10^{-7} \text{ M}}$$



$$[\text{Ca}^{2+}][\text{SO}_4^{2-}] = 2.4 \times 10^{-5}$$



$$[\text{Ag}^+]^2[\text{SO}_4^{2-}] = 1.5 \times 10^{-5}$$

$[\text{Ca}^{2+}] = 0.050 \text{ M}$ after 99% precipitated = ~~5.0~~ $5.0 \times 10^{-4} \text{ M}$

$$(5.0 \times 10^{-4})x = 2.4 \times 10^{-5}$$

$$x = [\text{SO}_4^{2-}] = 0.048 \text{ M}$$

since: $(0.030)^2(0.048) = 4.32 \times 10^{-5} > 1.5 \times 10^{-5}$

→ Ag_2SO_4 would have begun to precipitate ←

Ag begins to precipitate when $[\text{SO}_4^{2-}] = \frac{1.5 \times 10^{-5}}{(0.030)^2}$
 $= 0.0167 \text{ M}$

$$[\text{Ca}^{2+}] = \frac{2.4 \times 10^{-5}}{0.0167} = \boxed{1.4 \times 10^{-3} \text{ M}}$$