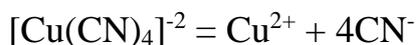
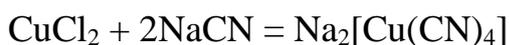


## Question #83028, Chemistry / General Chemistry | for completion

The equilibrium constant for the formation of  $\text{Cu}(\text{CN})_4^{2-}$  is  $2.0 \times 10^{30}$ . Calculate the value of  $p\text{Cu}^{2+}$ , i.e.  $-\log[\text{Cu}^{2+}]$ , if 2.24 g of  $\text{CuCl}_2$  are dissolved in 1000 L of a 0.910 M solution of  $\text{NaCN}$ . The addition of  $\text{CuCl}_2$  does not affect the volume (the final volume is always 1,000 L).

Answer:



$$K = [\text{Cu}^{2+}] \times [\text{CN}^-]^4 / [\text{Cu}(\text{CN})_4]^{2-}$$

$$K = 2 \times 10^{-30}$$

$$n = m/M_r = 2.24 / 135 = 0.0166 \text{ mol } (\text{CuCl}_2)$$

$$n = C_M \times V = 0.91 \times 1000 = 910 \text{ mol } (\text{NaCN})$$

$$[\text{Cu}(\text{CN})_4]^{2-} = 0.0166 \text{ mol and } C_M = 0.0000166 \text{ M}$$

$$4[\text{Cu}^{2+}] = [\text{CN}^-] \text{ and } 4[\text{Cu}^{2+}]^5 = K \times [\text{Cu}(\text{CN})_4]$$

$$[\text{Cu}^{2+}] = (K \times [\text{Cu}(\text{CN})_4] / 4)^{1/5} = (2 \times 10^{-30} \times 0.0000166 / 4)^{1/5} = 9.63 \times 10^{-8} \text{ M}$$

$$p[\text{Cu}^{2+}] = \lg -9.63 \times 10^{-8} = 7$$

$$p[\text{Cu}^{2+}] = 7$$

Answer provided by [www.AssignmentExpert.com](http://www.AssignmentExpert.com)