

Student Solution Manual

Student Solution Manual: Skoog et al., *Fundamentals of Analytical Chemistry*, 10e,
© 2022, 978-0-357-45055-0, Chapter 9: Solving Equilibrium Problems for Complex Systems

Some of the answers below may differ in format but have the same value as your result. Please check with your instructor if a specific format is desired.

Chapter 9

- 9-2.** Why are simplifying assumptions in equilibrium problems restricted to relationships that are sums or differences?

Answer:

To simplify equilibrium calculations, we sometimes assume that the concentrations of one or more species are negligible and can be approximated as 0.00 M. In a sum or difference assuming a concentration is 0.00 M leads to an appropriate result. In contrast, if we were to simplify an equilibrium constant expression by assuming one or more concentrations are zero, we would be multiplying or dividing by 0.00, which would render the expression meaningless.

- 9-4.** Why do molar concentrations of some species appear as multiples in charge-balance equations?

Answer:

A charge-balance equation is derived by relating the concentration of cations and anions
no. mol/L positive charge = no. mol/L negative charge

For a doubly charged ion, such as Ba^{2+} , the concentration of charge for each mole is twice the molar concentration of the Ba^{2+} . That is,

$$\text{mol/L positive charge} = 2[\text{Ba}^{2+}]$$

Thus, the molar concentration of all multiply charged species is always multiplied by the charge in a charge-balance equation.

- 9-5.** Write the mass-balance expressions for a solution that is

Solutions:

- (a) 0.2 M in HF.

$$0.20 = [\text{HF}] + [\text{F}^-]$$

- (c) 0.10 M in H_3PO_4 .

$$0.10 = [\text{H}_3\text{PO}_4] + [\text{H}_2\text{PO}_4^-] + [\text{HPO}_4^{2-}] + [\text{PO}_4^{3-}]$$

- (e) 0.0500 M in HClO_2 and 0.100 M in NaClO_2 .

$$0.0500 + 0.100 = [\text{HClO}_2] + [\text{ClO}_2^-]$$

$$[\text{Na}^+] = C_{\text{NaClO}_2} = 0.100 \text{ M}$$

Skoog Instructor Manual

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Instructor's Manual with Test Items to Accompany Biology, by Leland G. Johnson Douglas G. Fratianne,1987

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