

CHAPTER 16 LEARNING OBJECTIVES

To satisfy the minimum requirements for this course, you should master the following learning objectives.

Explain the common ion effect and calculate the change in pH of acidic and basic solutions caused by the addition of a common ion.

Explain how a buffer works on the molecular level and be able to

- calculate the pH of a given buffer,
- describe how to prepare a buffer of a given pH
- discuss the importance of buffer capacity.
- calculate the change in pH of a simple buffer solution of known composition caused by adding a small amount of strong acid or base.

Sketch the general shapes of acid-base titration curves and

- given a titration curve, identify the titration as a:
 - titration of a strong acid with a strong base (or vice-versa)
 - titration of a weak acid with a strong base
 - titration of a weak base with a strong acid
- identify the dominant species present at various points in a titration.
- identify the equivalence point and calculate the volume of titrant required to reach the equivalence point.
- be able to calculate the pH at the equivalence point.
- identify the buffer region for a titration of a weak acid with a strong base or the titration of weak base with a strong acid.
- identify the point within the buffer region where the pH is equal to the pK_a for the weak acid in the buffer.
- explain how an indicator works.

Define the solubility-product constant (K_{sp}) for a salt and

- write the K_{sp} expression for a given reaction, or the balanced chemical reaction for a given K_{sp} .
- calculate K_{sp} from solubility data and solubility from the value of K_{sp} .
- describe and calculate the effect of an added common ion on the solubility of a slightly soluble salt.
- describe and calculate the effect of a change in pH on the solubility of a salts that contain a basic anion.
- relate Q , the reaction quotient, to K_{sp} to determine whether precipitation will occur.

Understand the meaning of the Key Words on page 757.