

The concepts in this chapter are part of Big Idea 6 on equilibrium. Buffer solutions and their properties, titrations and titration curves, and precipitate formation concepts are part of the AP Chemistry Curriculum.

16.1 The Danger of Antifreeze

1. Explain how the blood is able to keep a stable pH. What species are used to maintain this stability?

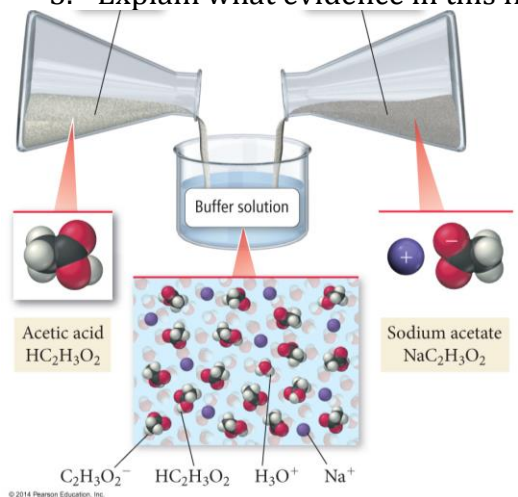
16.2 Buffers: Solutions that Resist pH Change

2. What is a buffer?

a. What composes a buffer?

b. How does a buffer work?

3. Explain what evidence in this figure below supports the claim that this is a buffer solution.



16.3 Buffer Effectiveness: Buffer Range and Buffer Capacity

4. What factors determine the effectiveness of a buffer?

5. What is buffer capacity?

6. What is the range of a buffer? How is it determined?

7. A buffer is most effective when which two conditions are met? Explain why.

8. How can you calculate the range over which a buffer will be most effective?

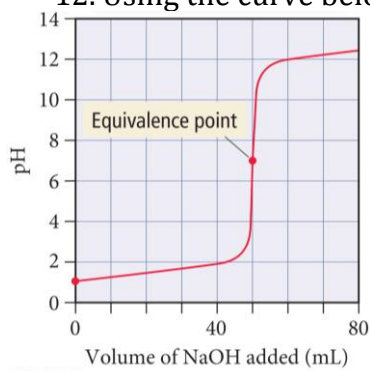
9. What is the range of effectiveness for a buffer with a pK_a of 6?

16.4 Titrations and pH Curves

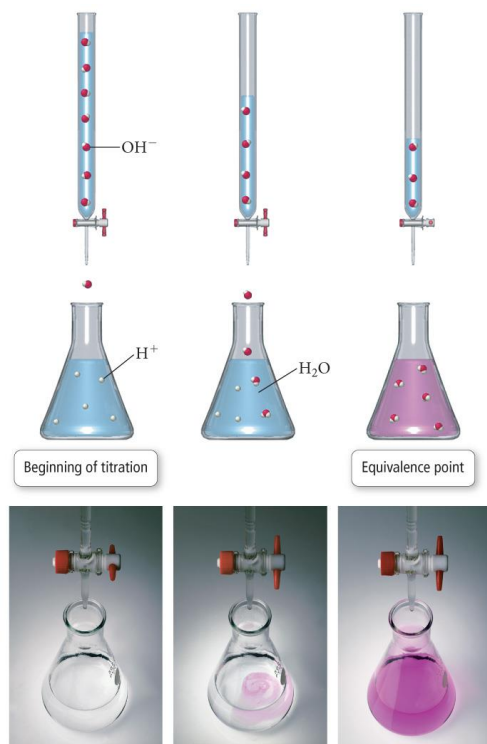
10. What is the equivalence point of a titration?

11. What is a titration curve?

12. Using the curve below, describe what evidence is provided in a titration curve.



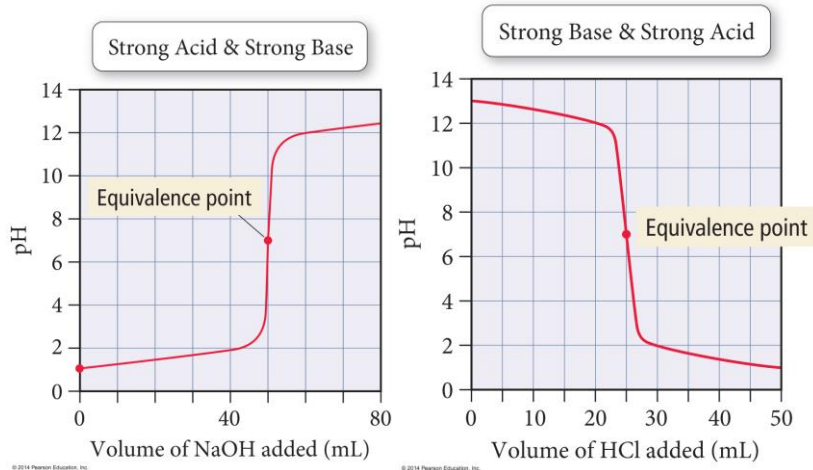
13. Describe what is occurring in the image at right. What does the observation in each flask indicate?



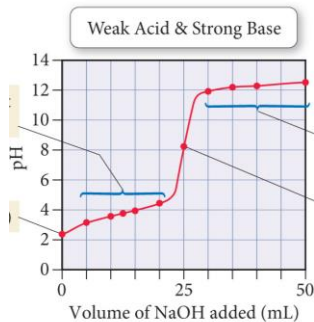
14. What does the shape of a titration curve depend on?

15. Compare and contrast these two titration curves.

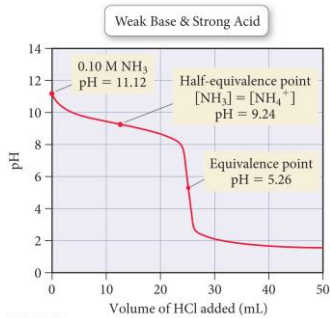
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16. How does the titration curve from a titration of a weak acid and a strong base differ from a titration with a strong acid and a strong base?
17. What does the amount of base or acid added to reach the equivalence point depend on?
18. How can a titration curve be used to determine the pK_a of an acid?
19. Why is the pH of a titration of a weak acid and strong base always basic at the equivalence point?
20. Explain how this titration curve indicates a weak acid and strong base were titrated.

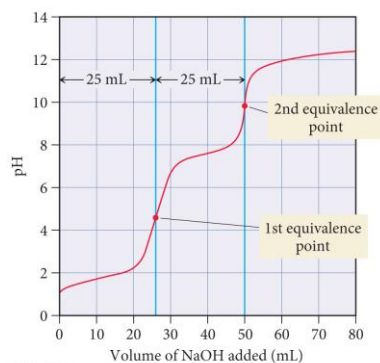


21. What features of this titration curve indicate a weak base was titrated with a strong acid?



22. What features of this titration curve indicate the titration was done with a polyprotic acid?

Titration of a Polyprotic Acid



23. What does each equivalence point in a polyprotic titration represent?

24. What does the endpoint of a titration indicate?

- What is the difference between an equivalence point and an end point of a titration?
- Why is it important to choose the right indicator?

25. What color is phenolphthalein in an acid? In a base?

16.5 Solubility Equilibria and the Solubility Product Constant

26. What is K_{sp} ? What does K_{sp} indicate?

27. What is molar solubility? What are the units of molar solubility? How is it calculated?

28. Explain why K_{sp} is not the same as molar solubility.

29. What effect do common ions have on solubility of a compound?

30. How does pH affect solubility of a compound? Use magnesium hydroxide as an example in both a basic pH and an acidic pH.

16.6 Precipitation

31. What is the differences between Q and K_{sp} ?

32. What conditions are present in...

a. An unsaturated solution?

b. A saturated solution?

c. A supersaturated solution?

33. Explain how Q can be used to determine if two solutions poured together will precipitate.