

Ca(OH) ₂ has a low solubility in water. How can it be a strong base?	Strength is defined by % ionization. Even though only a small amount of Ca(OH) ₂ dissolves, all that dissolves also dissociates.
What does the strength of an acid or base indicate about its conjugate?	Conjugates have opposite strength. I.e. the conjugate of a strong acid is a weak base, the conjugate of a strong base is a weak acid.

15.6

What is a buffer?	A buffer is a pair of substances in solution that resist changes in pH when either acid or base is added. This pair of substances is often a weak acid and a salt of the acid.
Give an example of a buffer.	Acetic acid (HC ₂ H ₃ O ₂) plus sodium acetate (NaC ₂ H ₃ O ₂).
Write the general equation important in buffer systems.	HA(aq) ↔ H ⁺ (aq) + A ⁻ (aq)
Explain how a buffer resists changes in pH.	With the addition of H ⁺ , HA(aq) ↔ H ⁺ (aq) + A ⁻ (aq) shifts left, removing some of the added H ⁺ . Conversely, added OH ⁻ removes H ⁺ by forming water. This shifts the equilibrium to the right and more H ⁺ is produced, compensating for the initial loss of H ⁺ .

15.8

Define cation and anion.	A cation is a positive ion. An anion is a negative ion.
With the use of a chemical equation show how anions can affect pH.	A ⁻ + H ₂ O ↔ HA + OH ⁻ (i.e. formation of a base from water)
With the use of a chemical equation show how cations can affect pH.	XH ⁺ + H ₂ O ↔ X + H ₃ O ⁺ (i.e. formation of an acid from water)
What name is given to the formation of acid or base from ions? Why?	It is called hydrolysis of ions because the ions are reacting with water. (Hydrolysis means a reaction with water).
Which anions result in the formation of base? Which do not.	Anions with weak conjugate acids form bases. Anions with strong conjugate acids do not form bases.
Would NaC ₂ H ₃ O ₂ form a base? What about NaCl?	The conjugate acid of C ₂ H ₃ O ₂ ⁻ is the weak acid HC ₂ H ₃ O ₂ , thus a solution of NaC ₂ H ₃ O ₂ would be basic. The conjugate acid of Cl ⁻ is the strong acid HCl, thus a solution of NaCl would be neutral.
Explain why C ₂ H ₃ O ₂ ⁻ forms a base.	C ₂ H ₃ O ₂ ⁻ reacts with water: C ₂ H ₃ O ₂ ⁻ + H ₂ O ↔ HC ₂ H ₃ O ₂ + OH ⁻
What is a second way to view the formation of a base by C ₂ H ₃ O ₂ ⁻ ?	HC ₂ H ₃ O ₂ is a weak acid, thus C ₂ H ₃ O ₂ ⁻ in water participates in the equilibrium: C ₂ H ₃ O ₂ ⁻ + H ⁺ ↔ HC ₂ H ₃ O ₂ . According to Le Chatelier's principle the presence of C ₂ H ₃ O ₂ ⁻ from NaC ₂ H ₃ O ₂ will cause a decrease in H ⁺ .
Explain why Cl ⁻ does not form a base.	The reaction Cl ⁻ + H ⁺ ← HCl is not an equilibrium. HCl is a strong acid, meaning that it is 100% ionized. Thus, the presence of Cl ⁻ will not remove H ⁺ .
How can the effect of a salt on pH easily be determined?	Think of the acid of the salt and the base of the salt. If Ka < Kb a base is formed, if Ka > Kb an acid is formed.
Would a solution of NH ₄ Cl be acidic, neutral, or basic?	The acid of this salt is HCl (high Ka). The base of this salt is NH ₃ (low Kb). Since Ka > Kb, the solution would be acidic.
What is the difference between Ka, Kb, Kc, Keq, Ksp, Kw?	Kc and Keq are the same thing. All of the other K's are specific types (or subsets) of Kc. The purpose of naming them differently is that it tells us what kind of problem we are dealing with. Ksp, Ka, Kb, Kw all have to do with the formation of ions. In Ksp and Kw the reactants are solid or liquid and thus are not found in the equilibrium law. In Ka and Kb the reactants are aqueous and are thus included in the equilibrium law.

Review examples 15.1-15.6, 15.9-15.11, 15.20, 15.21