

# EXPERIMENT 19

## ACIDIC AND BASIC SALTS

### INTRODUCTION

Water makes up about 60% of the weight of a human body; other animals contain a similar proportion of water, and some plants are almost 95% water. Water covers about 70% of the earth's surface; also, it is in the soil and is present as vapor in the atmosphere. Consequently, reactions that occur in aqueous solutions and reactions in which water participates are very important to us; many are essential to the life and growth of organisms. These reactions might affect the pH of water by using or producing hydronium or hydroxide ions.

It is apparent from the formulas of some compounds that they will produce  $\text{H}_3\text{O}^+$  or  $\text{OH}^-$  in aqueous solution. An Arrhenius acid contains hydrogen, which is usually written first in the formula to emphasize its ability to react with water producing  $\text{H}_3\text{O}^+$ . An ionic Arrhenius base contains hydroxide ions, which separate from the positive ions when the base dissolves in water.

Salts are ionic compounds that contain a cation from a base and an anion from an acid. Even though most salts do not contain H or OH, many of them do react with water changing its pH. Such a reaction is called the *hydrolysis of a salt*, the reaction of an ion of a dissolved salt with water producing  $\text{H}_3\text{O}^+$  or  $\text{OH}^-$ .

The hydrolysis of a negative ion produces the negative ion of water. This reaction occurs if the anion is the conjugate base of a weak acid. For example, HCN is a weak acid;  $K_a = 4.9 \times 10^{-10}$ :



The acid molecule HCN has little tendency to donate protons; its conjugate base,  $\text{CN}^-$ , is a good proton acceptor. Consequently, when a salt containing  $\text{CN}^-$ , such as NaCN, dissolves in water, a Brønsted-Lowry acid-base reaction occurs between  $\text{H}_2\text{O}$  (acid) and  $\text{CN}^-$  (base); that is, a proton is transferred from  $\text{H}_2\text{O}$  to  $\text{CN}^-$ :



The resulting solution is basic, because hydroxide ions in excess of those produced by the autoionization of water are present.

The hydrolysis of a positive ion produces the positive ion of water. This reaction occurs if the cation is the conjugate acid of a weak base. Molecular bases such as  $\text{NH}_3$  are weak bases:



For this reaction,  $K_b = 1.8 \times 10^{-5}$ . The ammonium ion can donate  $\text{H}^+$  to a chemical species that is capable of acting as a base. Consequently, when a salt containing  $\text{NH}_4^+$  dissolves in water,  $\text{NH}_4^+$  and  $\text{H}_2\text{O}$  react in a Brønsted-Lowry fashion:



Some hydrated metal ions also hydrolyze producing acidic solutions. The strong attraction between a small, highly charged, metal ion and the oxygen atom of a bound water molecule weakens an oxygen-hydrogen bond in the bound water molecule. As a result, the hydrate acts as a proton donor:

# Experiment 19 Acids And Basic Salts

**WJ Hussar**

## **Experiment 19 Acids And Basic Salts:**

## Adopting the Beat of Appearance: An Mental Symphony within **Experiment 19 Acids And Basic Salts**

In a global eaten by monitors and the ceaseless chatter of instant interaction, the melodic elegance and mental symphony produced by the published word frequently fade in to the back ground, eclipsed by the persistent sound and distractions that permeate our lives. But, set within the pages of **Experiment 19 Acids And Basic Salts** a wonderful literary prize overflowing with fresh thoughts, lies an immersive symphony waiting to be embraced. Constructed by a masterful composer of language, this charming masterpiece conducts readers on an emotional journey, skillfully unraveling the hidden tunes and profound impact resonating within each carefully constructed phrase. Within the depths with this poignant assessment, we will examine the book is main harmonies, analyze its enthralling publishing style, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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