Chemistry Chapter 14/15 Cheat Sheet

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Vocab

Binary Acid	Contains only two different elements: hydrogen and one other electronegative element
Oxyacid	Compound of hydrogen, oxygen, and a third nonmetal element
Arrhenius Acid	Chemical compound that increases the concentration of hydrogen ions H+
Arrhenius Base	Chemical compound that increases the concentration of hydroxide ions OH-
Strong Acid	Ionizes completely in an aqueous solution
Weak Acid	Releases few hydrogen ions in an aqueous solution
Bronsted-Lowrey Acid	Molecule or ion that is a proton donor
Bronsted-Lowrey Base	Molecule or ion that is a proton acceptor
Bronsted-Lowrey Acid-Base Reaction	Protons are transferred from an acid to a base
Monoprotic Acid	Acid that can donate only one proton per molecule
Polyprotic Acid	Acid that can donate more that one proton per molecule
Diprotic Acid	Acid that can donate two protons per molecule
Triprotic Acid	Acid that can donate three protons per molecule
Lewis Acid	Atom, ion, or molecule that accepts an electron pair to form a covalent bond
Lewis Base	Atom, ion, or molecule that donates an electron pair to form a covalent bond
Lewis Acid-Base Reaction	Formation of one or more covalent bonds between an electron-pair donor and an electron-pair acceptor
Conjugate Base	Substance that is left after an acid has given up a proton
Conjugate Acid	The acid that is formed after a base accepts a proton
Amphoteric	Any substance that can act as an acid or a base
Salt	Ionic compount composed of a cation from a base and an anion from an acid
Neutralization	The reaction of hydronium ions and hydroxide ions to form water molecules and salts
Self-Ionization of Water	Two water molecules produce a hydronium ion and a hydroxide ion by transfer of a proton
pH	The negative of the common log of the hydronium ion concentration
pOH	The negative of the compound log of the hydroxide ion concentration
Acid-Base Indicators	Compounds whose colors are sensitive to pH
Transition Intervals	The pH range over which an indicator changes color

Vocab (cont)	
pH Meter	Determines the pH of a solution by measuring the voltage between the two electrodes that are placed in the solution
Titration	Controlled addition and measurement of the amount of a solution of known concentration required to react completely with a measured amount of a solution of unknown concentration
Equivalence Point	The point at which the two solutions used in a titration are present chemically equivalent amounts
End Point	The point in a titration at which an indicator changes color
Standard Solution	Solution that contains the precisely known concentration of a solute
Primary Standard	highly purified solid compound used to check the concentration of the known solution in a titration

Determining the pH and Titrations

The pH of a solution can be measured using either a pH meter or acid-base indicators.

Titration uses a solution of known concentration to determine the concentration of a solution of unknown concentration.

To determine the end point of a titration, one should choose indicators that change color over ranges that include the pH of the equivalence point.

When the molarity and volume of a known solution used in aa titration are known, then the molarity of a given volume of an unknown solution can be found.

Properties of Acids and Bases

Acids have a sour taste and react with active metals. Acids change the colors of acid-base indicators, react with bases to produce salts and water, and conduct electricity in aqueous solutions.

Bases have a bitter taste, feel slippery to the skin in dilute aqueous solutions, change colors of acid-base indicators, react with acids to produce salts and water, and conduct electricity in aqueous solutions.

An arrhenius acid contains hydrogen and ionizes in aqueous solution to form hydrogen ions. An Arrhenius base produces hydroxide ions in aqueous solution.

The strength of an Arrhenius acid or base is determined by the extent to which the acid or base ionizes or dissociates in aqueous solutions.

Acid-Base Theories

A Bronsted-Lowry acid is a proton donor. A Bronsted-Lowry base is a proton acceptor.

A Lewis acid is an electron-pair acceptor. A Lewis base is an electron-pair donor.

Acids are described as monoprotic, diprotic, or triprotic depending on whether they can donate one, two, or three protons per molecule, respectively, in aqueous solutions. Polyprotic acids include both diprotic and triprotic acids.

Aqueous Solutions and the Concept of pH

Pure water undergoes self-ionization to give 1.0x10^{-7} M H30+ and 1.0x10 -7 M OH- at 25C

pH=-log[H3o+]; at 25C, pH+pOH=14

At 25C, acids have a pH of less than 7, bases have a pH of greater than 7, and neutral solutions have a pH of 7.

If a solution contains a strong acid or a strong base, the [H3O+] and the [OH-}, and the pH can be calculated from the molarity of the solution. If a solution contains a weak acid or a weak base, the [H3O+] and the [OH-] must be calculated from an experimentally measured pH.

Acid-Base Reactions

A Bronsted-Lowry acid-base reaction, there are two conjugate acid-base pairs.

A strong acid has a weak conjugate base; a strong base has a weak conjugate acid.

Proton-transfer reactions favor the production of the weaker acid and weaker base.

The acidic or basic behavior of a molecule containing -OH groups depends on the electronegativity of other atoms in the molecule and on the number of oxygen atoms bonded to the atom that is connected to the -OH group.

A neutralization reaction produces water and an ionic compound called a salt.

Acid rain can create severe ecological problems

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