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Acids-Bases Theory

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Abstract: **The title of my Theory is called as acids-bases Theory. The purpose of my Theory is finding acids and bases with their strength in organic and inorganic fields of chemistry. This Theory explains characteristics, properties, relation, structure, strength, neutralisation of acids-bases. And also it explains classification of acid-bases like covalent acid bonds, dative acid bonds, and ionic base bonds. Salt is defined as additional product formed by neutralisation. Strength of acids and bases defined in terms of electronegativity and electropositivity of atoms or molecules.**

Keywords: **Electronegativity, Electropositivity, chemical bonds, valency electrons, and ions.**

1. INTRODUCTION

Acids-bases Theory which description of acids and bases. This theory was based on electrostatic force in between atoms or molecules. And it is updated from limitations of Arrhenius, Bronsted-Lowry, and Lewis theories.

Arrhenius Theory was proposed by Arrhenius in 1887 based on ionisation concept. He failed to explain some acidic and basic nature which doesn't have H^+ and OH^- ions of molecules such that CO_2, CaO…..etc.

Other scientists proposed bronsted-lowry theory based on proton transfer in atoms. He fails to explain the acidic nature of some gases like CO_2, SO_2…..etc and also basic nature of CaO, BaO…etc.

Lewis theory proposed by Lewis scientist based on transfer of pair electrons in acid and bases. He fails to explain the strength, neutralisation, s-p overlap of acid and bases.

This theory covers all fields in chemistry. It explains inorganic and organic acids-bases, strength, salt formed by neutralisation. It provides the structure of acids and bases in inorganic compounds. It gives easy to remember which are acids and bases by using structure of acids and bases.

2. ACIDS-BASES THEORY

2.1 INTRODUCTION

This theory defined characteristics, relation, properties of acids and bases based on Rebert Boyle properties and my experimental values. Properties, characteristics, relation of acid and bases mentioned as below.

Properties of acids and bases:

Acids:

- These turn blue litmus to red.
- These are sour to taste.
- These react with bases t form salts.
- These are corrosive in nature.

Bases:

- These turn red litmus to blue.
- These are bitter to taste.
- These react with acids to from salts.
- These are soapy to touch.

Relation between acids and bases:

Consider acids is A, bases is B, Neutralisation is 0.

- If A + B = 0, then salts are formed due to electronegativity of acids equal to electropositivity of bases.
- If A + B < 0, then acids are formed due to electronegativity of acids more than electropositivity of bases.
- If A + B > 0, then bases are formed due to electronegativity of acids less than electropositivity of bases.

Characteristics of acids and bases:

Acids:

- Electronegativity of acids more than Electropositivity of bases reacts and forms dative acid bonds.
- Strength of acids decreases by dilution.
- Reacts with metal to form hydrogen gas.
- Acids don't react itself.
- It maintains heat
- Increases the H+ concentration in water.
- Turns blue litmus indicator red.

Bases:

- Electronegativity of acids more than Electropositivity of bases reacts and forms ionic base bonds.
- Strength of acids decreases by dilution.
- Increases the OH- concentration in water.
- It maintains cool
- Turns red litmus indicator blue.
- pH > 7.

2.2 ACIDS

Definition:

Chemical substances which are accept required valency electrons due to electronegativity of gases are called "Acids".

Structure:

General structure of acid bonds in inorganic compounds is

$s_x.l_y.g_z + G_k \longrightarrow$ Acid bonds

Where $s_x.l_y.g_z$ is a solid, liquids, and gases are in I reactant

G_k is gases are in II reactant of equation.

General structure of acid bonds in organic compounds is

-C-COOH $\longrightarrow$ Acid bonds

Examples:

i) $C + O_2 \longrightarrow CO_2$
ii) $H + Cl \longrightarrow HCl$
iii) $H + SO_4^{2-} \longrightarrow HSO_4^-$

Explanation:

Acids are generally formed by solids and gases with accepting required valency electrons. It may be sharing or transferring electrons from one to other substance. Sx.ly.gz molecules having valency electrons containing cations are involves to donating electrons to Gases molecules. Gases are mostly important to formation of Acidic Bonds. Such gases like H, N, O, F, Cl without these gases there is no formation of Acidic bonds. Gases accept electrons from $s_x.l_y.g_z$. So gases are called as "Acceptors".

I reactant contains $s_x.l_y.g_z$ which have "cations" and II reactant contains only gases which "anions" And finally these two Reactants combined to from "Acids".

Classification of Acids:

Acids are classified into three types.

They are:

2.2.1 Ionic Acid bonds,
2.2.2 Covalent Acids bonds,
2.2.3 Organic Acid bonds.

2.2.1 Ionic acid bonds:

Acids which are formed by transfers of required valency electrons to Gases (II reactant) are called as "Ionic Acid bonds".

Note: There is no formation of acidic bonds by transferring required valency electrons because 99% of acids are formed by only sharing of electrons in between atoms or molecules

2.2.2 Covalent acid bonds:

Acids formed by sharing of required electrons to Gases (II reactant) are called "Covalent Acids bonds".

Examples:

HCl, CO_2, H_2SO_4, NH_3-BF_3, HSO_4^- ……..etc.

Explanation:

Sharing of required electrons to Gases (II reactant), Then the product gives covalent compounds which have Acidic Nature. Covalent Acids bonds are divided into three types. They are s-p overlap acid bond, double & triple acid bonds, and dative acid bonds.

S-p overlap acid bonds: These acids bonds are formed by sharing electrons in between s and p shell of atoms.

Examples: HCl, …….etc.

Double & triple acid bonds: These acids bonds are formed by sharing two or three electrons in between two atoms.

Examples: H_2SO_4, CO_2 ……etc.

Dative acid bonds: These acids bonds are formed by sharing lone pair of electrons in between acidic nature molecule and basic nature molecule.

Examples: NF_3-BF_3, PH_3-BF_3 ……etc.

Note:

In dative acid bonds, require electrons accepts by acidic nature of molecule. So we consider as Dative acid bonds.

2.2.3 Organic acid bonds:

Acids are formed by organic compounds are called "Organic Acid bonds".

Examples: CH_3COOH, HCOOH ……etc.

Explanation:

Organic compounds which contains –C-COOH structure Then the product contain –COOH at last of molecule(Right side of molecules) is indicates acidic nature of molecules.

2.3 BASES

Definition:

Chemical substances which are donates required valency electrons due to electropositivity of solids are called "Bases".

Structure:

General structure of basic bonds in inorganic compounds is

$S_k + s_x.l_y.g_z \longrightarrow$ base

Where S_k is a solids are in I reactant,

$s_x.l_y.g_z$ is a solids, liquids, and gases are in II reactant.

General structure of basic bonds in organic compounds is

-C- ……..etc, except -COOH

Examples:

NaOH, KOH, Na_2CO_3, N_2O_5, ……etc.

Explanation:

Bases are generally formed by solids and gases, by donating required valency electrons. It may be sharing or transferring electrons from one to other substances. Gases molecules having valency electrons containing (anions) are involve accepting electrons from solid molecules. Solid are mostly important to formation of basic bonds. Such solids are most important to formation of base bonds . Such solids like Na^+, Mg^{+2}, Fe^{+2}, Fe^{+3}……etc without these solids there is no formation of basic bonds.

In chemical equation, I reactant contains only solid which have "cations" and II reactant contains $s_x.l_y.g_z$ which have "anions" And finally I and II reactants combined to form the "base" component.

Classification of Bases:

The bases are classification of three types.

They are: 2.3.1 Ionic base bonds,

2.3.2 Covalent base bonds,

2.3.3 Organic base bonds.

2.3.1 Ionic base bonds

Bases are formed by transferring (donate) required valency electrons from solids (I reactant) are called "Ionic base bonds".

Examples: NaOH, KOH, MgO……etc

***Explanation*:**

Transferring of required electrons from solids (I reactant), then the product gives Ionic base compound.

For example: Consider NaOH molecule formed by reaction of Na^+ ions and OH^- ions in between electrons transfers from sodium (Na^+) to hydroxyl (OH^-) and forms NaOH. So this process is called as "Ionic base bond".

$$Na^+ + OH^- \longrightarrow NaOH$$

2.3.2 Covalent base bonds:

Bases are formed by sharing (Donates) of required valency electrons from solids are called "Covalent base bonds".

Note: There is no formation of basic bond by sharing required valency electrons because 99% of bases are formed by only transfer of electrons in between atoms or molecules

2.3.3 Organic base bonds:

Bases are formed by organic compounds are called "Organic Bases bonds".

Examples: CH_4, C_2H_6, C_3H_8……..etc.

Explanation:

Organic compounds which contain Hydrocarbon atom i.e. Alkynes and Alkenes. Then the product contains "C" at first atom of molecule (left side molecule) are shows it's has a Base Nature.

For examples:

i) $\underline{C}H_4 \longrightarrow$ Methane
ii) $\underline{C}_3H_6 \longrightarrow$ Propane

Consider, above example having carbon atoms at left side molecules it shows base nature of Organic compounds.

2.4 NEURALISATION

The reaction between acid which having covalent acidic nature and base which having ionic base nature to forms salt and liquids and gases are called "Neutralisation".

Examples:

01. $6CO_2 + 12H_2O \longrightarrow C_6H_{12}O_6 + 6H_2O + 6O_2$
02. $2HCl + MgO \longrightarrow MgCl_2 + H_2O$
03. $2HNO_3 + 2AgO \longrightarrow 2AgNO_3 + H_2O_2$

Consider, above the examples gives additional products formed by acid and base reactions such that salt, liquids, and Gases.

2.5 SALT

The additional product formed by reaction of acid and base are called "Salt"

Examples: NaCl, KCl, $AgNO_3$……etc.

Explanation:

In chemical equation, Acids and Bases are reacts to forms one additional product which have neutral condition is known as "Salt".

For example:

01. NaCl (sodium chloride)

$$HCl + NaOH \longrightarrow NaCl + H_2O$$

02. $AgNO_3$ (sliver Nitrate)

$$2HNO_3 + 2AgO \longrightarrow 2AgNO_3 + H_2O_2$$

03. KCl (potassium chloride)

$$HCl + KOH \longrightarrow KCl + H_2O$$

2.6 STRENGTH OF ACIDS

1) *Strong acids:*

Acids which have more electronegativity charge in between atoms or molecules are known as "Strong acids".

Examples: H_2SO_4, HCl …etc.

2) *Weak acids*:

Acids which have less electronegativity charge in between atoms or molecules are known as "Weak acids".

Examples: CH_3COOH, H_2CO_3……..etc.

2.7 STRENGTH OF BASES:

1) *Strong bases:*

Bases which have more electropositive charge in between atoms or molecules are known as "Strong bases".

Examples: NaOH, KOH…etc.

2) *Weak bases*:

Bases which have less electropositive charge in between atoms or molecules are known as "Weak bases".

Examples: NH_4OH, $Mg(OH)_2$……etc.

3. CONCLUSTION

The result of this research paper shows that the strength and structure of acids and bases to find easy and calculate their strength. We can find out the acids and bases easy by using formula and strength will be calculated whether it

is strong or weak. By using this theory we have so many advantages like easy to remember, easy to calculate acids and bases strengths, easy to learn and understand this theory

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