**5.1 Acids and Bases**

**pH Scale**

The pH scale is: **a number scale that indicates how acidic or basic (alkaline) a solution is**

 acidic neutral basic

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Note: one unit on the pH scale = 10x change

*Determine the change in pH for each example:*

 *a) pH 6 to pH 4*

 *b) pH 4 to pH 6*

 *c) pH 1 to pH 6*

 *d) pH 12 to pH 9*

 *e) pH 3 to pH 2*

**pH Indicators**

pH indicators:

* 1. Litmus:
	2. Universal indicator:
	3. Phenolphthalein:
	4. Bromothymol blue:
	5. v) methyl orange, methyl red, indigo carmine

Natural source pH indicator – e.g. red cabbage

 pH 2 – red

 pH 3 – red-pink

 pH 4 – purple

 pH 6 – violet

 pH 8 – blue

 pH 10 – blue-green

 pH 12 – green-yellow

 pH 13 - green

**Acids and Bases**

*Identifying acids and bases*

Acids and bases can be identified by their chemical formulas:

 1) Acids:

 Exception:

 2) Bases –

*Examples: Acid or Base?*

*a) H2SO4 b) NH4OH*

*c) HI d) HClO2*

*e) Ca(OH)2 f) CH3COOH*

Naming Acids

|  |  |  |
| --- | --- | --- |
|  | Non-oxygen Acids | Acids containing oxygen |
| with polyatomic ion ending in “ate” | with polyatomic ion ending in “ite” |
| Example  | HClHydrogen chloride | H2CO3Hydrogencarbonate | H2SO3Hydrogensulphite |
| Name change of negative ion | add hydro- and -ic | add -ic | add -ous |
| Name |  |  |  |

Naming Bases

Bases are named using their regular chemical name. (e.g. NaOH is sodium hydroxide)

*Examples:*

 *a) HBr b) HClO4*

 *c) NH4OH d) HNO2*

 *e) Mg(OH)2 f) hydrochloric acid*

 *g) sulphuric acid h) sodium hydroxide*

 *i) phosphorous acid j) calcium hydroxide*

Properties of Acids and Bases

|  |  |  |
| --- | --- | --- |
| Property | Acid | Base |
| Example |  |  |
| Taste |  |  |
| Touch |  |  |
| Indicator tests |  |  |
| Reaction with some metals |  |  |
| Electric conductivity |  |  |
| pH |  |  |
| Production of ions |  |  |

**5.2 Salts**

**Salts**

Salts are:

A salt is made up of a positive ion (e.g. Na+) from the base and a negative ion (e.g. Cl-) from the acid:

*Predict the salt that will be produced:*

*1) HCl + KOH → \_\_\_\_\_\_\_\_\_\_ + H2O*

*2) H2CO3 + Mg(OH)2 → \_\_\_\_\_\_\_\_\_\_ + H2O*

*3) CH3COOH + CsOH → \_\_\_\_\_\_\_\_\_\_ + H2O*

*4) H3PO4 + NaOH → \_\_\_\_\_\_\_\_\_\_ + H2O*

*5) HNO3 + Ca(OH)2 → \_\_\_\_\_\_\_\_\_\_ + H2O*

***Chemical Reactions that Produce Salts:***

**1) Acid-Base Neutralization**

Neutralization is the chemical reaction that occurs when

*Example:*

**2) Acid and Metal**

When metals react with acids to produce a salt, they usually release

*Example:*

**3) Acid and Carbonate**

When carbonates react with acids to produce a salt, they release and

*Example:*

*Predict the products for the reactions:*

*1) Neutralization*

 *CH3COOH + Mg(OH)2 →*

*2) Acid and metal*

 *HBr + Al →*

*3) Acid and carbonate*

 *HNO3 + CaCO3 →*

**Chemical Reactions that Produce Acids and Bases:**

**1) Metal Oxide and Water**

When metal oxides dissolve in water, a \_\_\_\_\_\_\_\_\_\_ is produced:

**2) Non-Metal Oxide and Water**

When non-metal oxides dissolves in water, an \_\_\_\_\_\_\_\_\_\_ is produced:

*Predict the products for the reactions:*

*1) Metal oxide and water*

 *CaO + H2O →*

*2) Non-metal oxide and water*

 *CO2 + H2O →*

**5.3 Organic Compounds**

**Organic Compounds**

Organic compounds are compounds containing \_\_\_\_\_\_\_\_\_\_\_\_\_. Two common groups are hydrocarbons and alcohols:

1) Hydrocarbons:

*Examples:*

 methane

 ethane

 propane

 butane

2) Alcohols:

*Examples:*

 Methanol

 Ethanol

 Isopropyl alcohol

**Inorganic Compounds**

Inorganic compounds are compounds that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_contain carbon.

1) Containing carbon

 a) Carbonates – e.g. CaCO3, Na2CO3

 b) Carbides – e.g. Al4C3, SiC

 c) Oxides – e.g. CO, CO2

2) Not containing carbon – e.g. FeCl2, (NH4)2SO3, PBr3

*Examples: Classify as either organic or inorganic*

*a) CH3CH2OH b) K2HC6H5O7*

*c) Al4C3 d) C8H10CH2OH*

*e) CaCO3 f) FeCl2*

*g) CH4 h) PBr3*

*i) CO2 j) C6H5COOH*