Difference Between Concentrated Acid and Strong Acid

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Key Difference - Concentrated Acid vs Strong Acid

An acid is a chemical compound that can release H^+ ions (protons) to the medium where it resides through ionization of the acid molecule. There are two major types of acids as strong acids and weak acids. Strong acids are acids that completely dissociate in aqueous solutions, releasing H^+ ions. Strong bases are chemical compounds that completely dissociate in aqueous solutions forming OH^- ions. Based on the concentration of the acid molecules in the aqueous solution, these acids can be in two forms as concentrated acids and dilute acids. The **key difference** between a concentrated acid and a strong acid is that **concentrated acids have a high amount of acid molecules in a unit amount of a mixture whereas strong acids completely dissociate in an aqueous solution**.

What is a Concentrated Acid?

Concentrated acid is an acid solution having a high amount of acid molecules per unit volume of the solution. The term "concentrated" means the presence of a high amount of a component in a particular mixture. A concentrated solution contains the maximum amount of acid molecules. the acid molecules are known as solutes because these molecules are dissolved in water to form the acid solution.

The amount of solute present can vary with the temperature. That is because the solubility of a compound is directly affected by the temperature. The amount of solute present at one temperature may not equal to the amount at a different temperature. Most of the solutes have a high solubility at higher temperatures.

Concentrated acids are very corrosive, hence dangerous. And also, some concentrated acids are shock sensitive. Therefore, these acids can cause explosions due to improper handling. Sometimes, the inhalation of concentrated acids can be fatal and can cause eye and skin burns. It can even result in a fire when contacted with other materials.

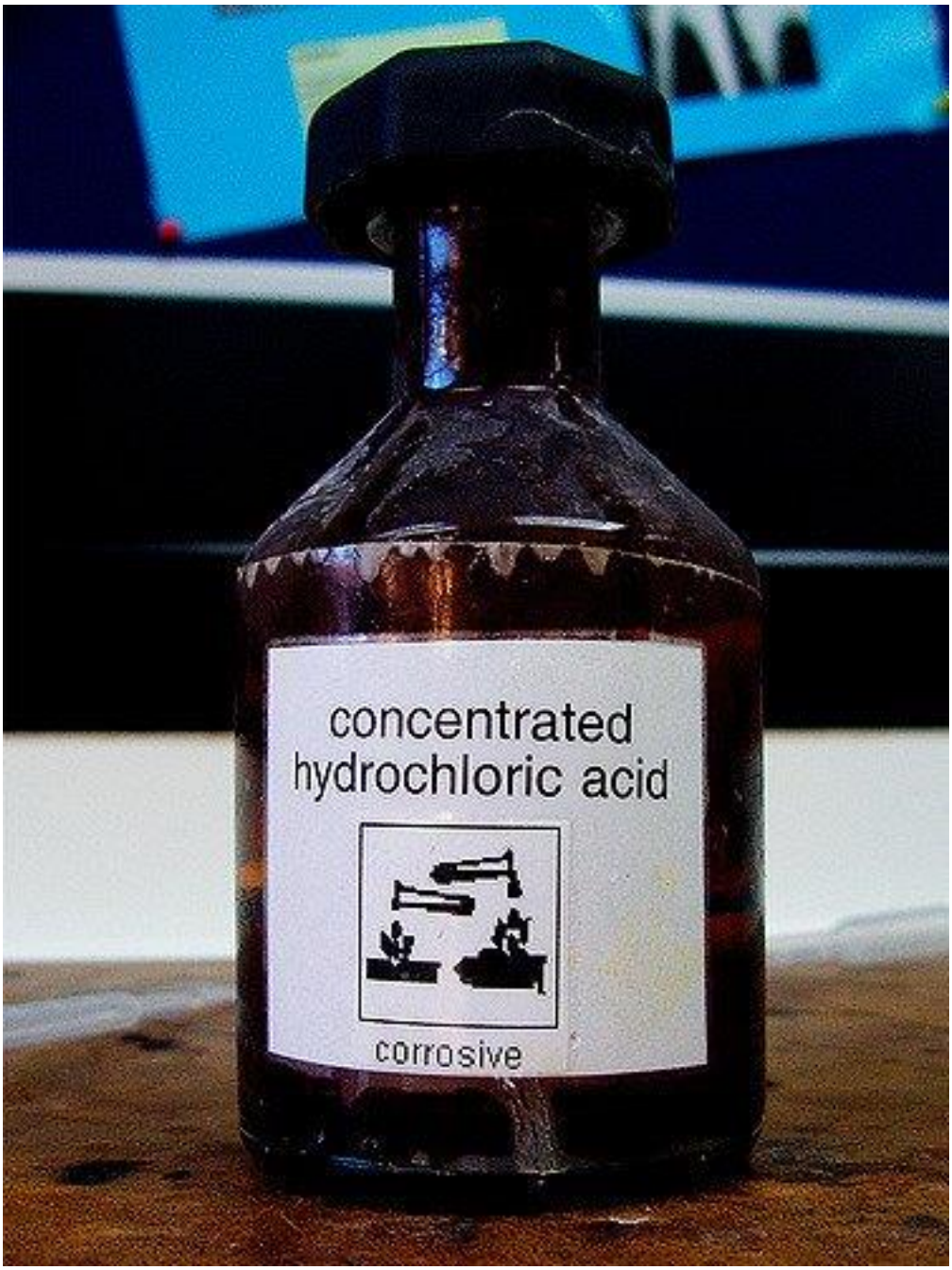

Figure 1: A Bottle of Concentrated HCl

The terms concentrated is mostly used in comparisons. For example, an HCl solution having a concentration of 18 mol/L is said to be more concentrated than a solution of 1 mol/L. the opposite of concentrated acid is “dilute acid”.

What is a Strong Acid?

A strong acid is an acid that is completely dissociated or ionized in an aqueous solution. Therefore, a strong acid has a higher capacity to release protons. In an aqueous solution, the released protons combine with water molecules forming hydronium ions (H_3O^+). Strong acids are categorized depending on the number of protons released per acid molecule;

1. Monoprotic acid – release one proton per acid molecule
2. Diprotic acid – release two protons per acid molecule.
3. Polyprotic acid – release more than two protons per acid molecule.

Acid strength:

The acid strength describes the ability or tendency to lose a proton from an acid molecule. Hence, it explains the dissociation of the acid. A completely dissociating acid has a high acid strength. (Weak acids dissociates partially).

The acid strength is measured by the acid dissociation constant (Ka) or its logarithmic value (pKa). Strong acids have a high Ka value and thus, a smaller pKa value.

$pK_a = -\log K_a$

Figure 02: Nitric Acid

Some examples of strong acids include the followings:

- Hydrochloric acid (HCl)
- Sulfuric acid (H_2SO_4)

- Nitric acid (HNO_3)
- Perchloric acid ($HClO_4$)
- Hydrobromic acid (HBr)

What is the Similarity Between Concentrated Acid and Strong Acid?

- Both Concentrated Acid and Strong Acid are very corrosive forms of acids.

What is the Difference Between Concentrated Acid and Strong Acid?

Concentrated Acid vs Strong Acid	
A concentrated acid is an acid solution having a high amount of acid molecules per unit volume of the solution.	A strong acid is an acid that is completely dissociated or ionized in an aqueous solution.
Concentration	
A concentration acid contains the maximum amount of solutes per unit volume of solution at a given temperature.	A strong acid does not contain the maximum amount of solutes per unit volume.
Acid Strength	
A concentrated acid may or may not have a high acid strength.	A strong acid always has a higher acid strength.

Summary - Concentrated Acid vs Strong Acid

Acids are mainly in two groups of strong acids and weak acids. These acids can be in either concentrated form or dilute form. The difference between a concentrated acid and a strong acid is that concentrated acids are acids that have a high amount of acid molecules in a unit amount of a mixture whereas strong acids are acids that completely dissociate in an aqueous solution.

Reference:

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3.Helmenstine, Anne Marie, D. "Strong Acid Definition and Examples." ThoughtCo, Jun. 15, 2017. Available here

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2.'Fuming nitric acid 40ml'By W. Oelen (CC BY-SA 3.0) via Commons Wikimedia

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