Mixture & Alligation

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Definition: When two or more types of liquids are mixed with each other in a vessel, we get what is called as a "mixture". Here the amount or quantities of two or more liquids is expressed in terms of respective ratios or percentage values.

For example, milk and water can be mixed to get a mixture. Mixtures can be identified by the name of liquids and their ratio.

Mixtures are of 3 types:

1. Solid mixture.
2. Liquid mixture.
3. Gaseous mixture.

Depending upon the number of ingredients of Types of mixtures:

Simple Mixtures: When two or more different ingredients/solutions are mixed together.

Compound Mixtures: When two or more simple mixtures are mixed together.

In mixture and solutions, we deal with 2 concepts:

(a) **Alligation**

(b) **Replacement**

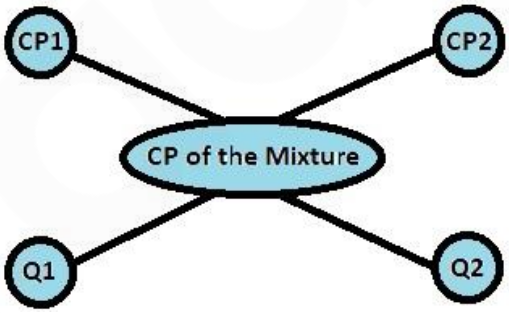
Alligation: It is a method in which two or more solutions/ingredients are mixed in different ratios and a desired mixture is obtained or a desired mixture is given and the respective ratio in which the given solutions are mixed is asked in question.

Note: The basic concept of Alligation lies in "weighted average". If we mix 2 things, and the average of both are A_1 and A_2, and the quantities of both are n_1 and n_2. Then the average of the mixture is called as "weighted average".

Weighted Average = $\frac{n1A1+n2A2}{n1+n2}$

Important Formulas for Mixture and Alligation:

1. If two different articles priced at CP_1 and CP_2 with their quantities Q_1, and Q_2 then the Cost Price of the Mixture is calculated by following Method:



2. Let a container contains "x" units of liquid from which "m" units of liquid are taken out and replaced by water or any other liquid. And this operation is repeated for "n" times. Thus, the quantity of remaining pure liquid after "n" operations:

$$= [x\left(1-\frac{m}{x}\right)^n$$