MIXTURE & ALLIGATION

- What is mixture ?
- What is alligation ?
- What is difference between alligation and mixture ?

MIXTURES

- Mixtures Contain Two Substances That Do not Chemically React With Each Other
- If A mixture of A and B is in the ratio 3:2 ,the concentration of A is 3/5 and the concentration of B is 2/5

ALLIGATION

- It is the rule thet enable to find the ratio in which two or more ingredients at the given price /concentration must be mixed to produce a mixture of a desired price /concentration.

  If two ingredients A and **B of price X and Y are mixed and the price of the resultant mixture is M(mean price)then the ratio (R) of the ingredients A and B is given by the rule of alligation.**

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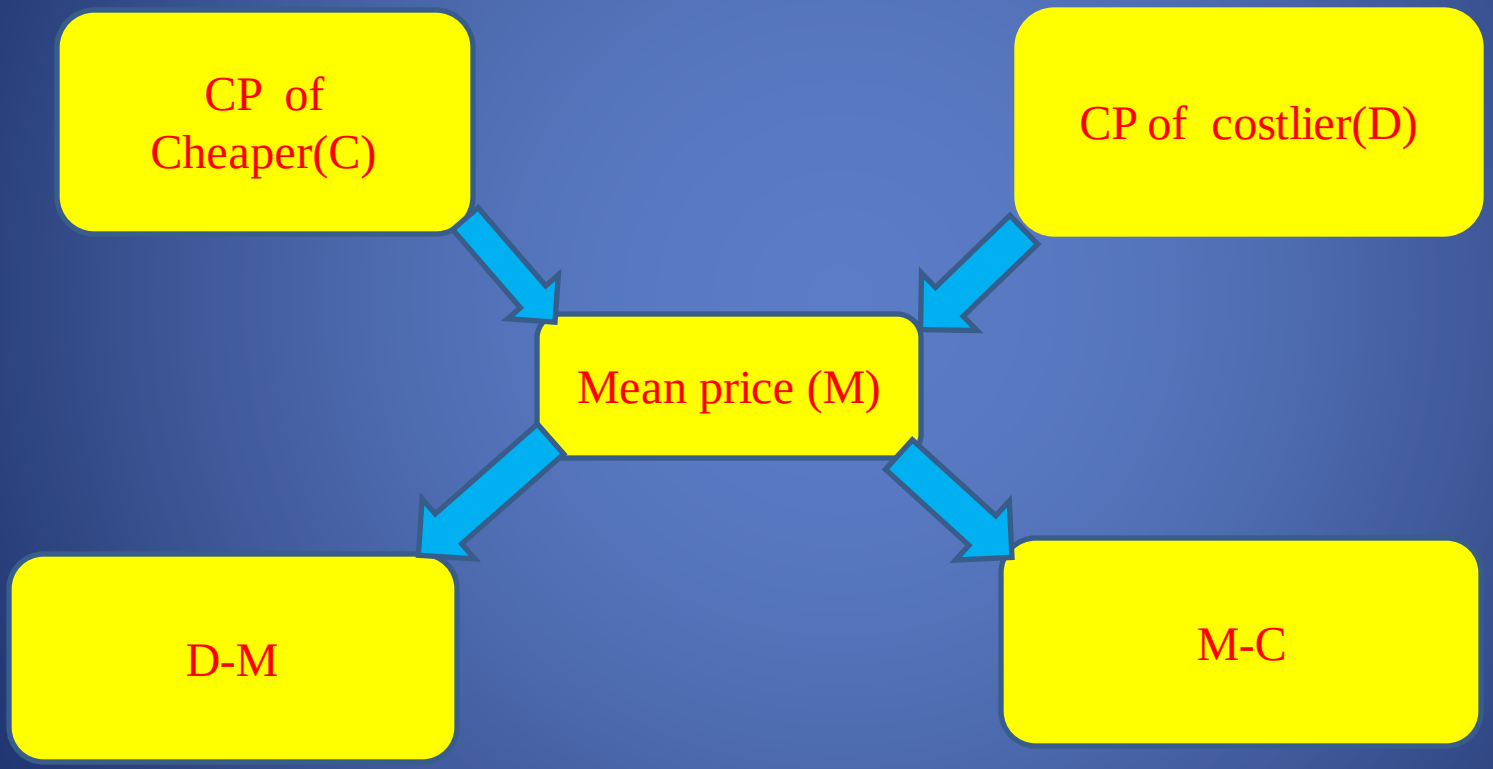
$$\frac{A}{B} = R = \frac{(M - Y)}{(X - M)}$$

Diagram representation



CHEAPER QUANTITY : COSTLIER QUANTITY =(D- M) : (M- C)

Example

In what proportin must a sugar at Rs.40 per kg be mixed with sugar at Rs.60 per kg so that the mixture be Rs.55 per kg?

Cheaper/dearer = 60-55 : 55-40

= 5/15

= 1:3

Removal and Replacement

- If a vessel contains x litre of liquid a and if y liters can be withdrawn and replaced by liquid B,then if Y litres of the mixture be withdrawn and replaced by liquid B,and the operation is repeated “n” in all,then:

$$\frac{\text{Quantity of liquid A after } n^{th} \text{ operation}}{\text{Initial quantity of liquid of A}} = \left[\frac{x-y}{x}\right]^n = \left[1-\frac{y}{x}\right]^n$$

Example

- A container is containing 80 litre of wine .8 liter of wine was taken out from this container and replaced by water.this processwas further repeated two times .how much wine is there in the container now?

= [{1-(8/80)}^3] * 80

= (9/10)*(9/10)*(9/10)*80

= 58.32 litres

Quantity Need To Be Added

- P gram of ingredient solution has a% ingredient in it.to increase the ingredient content to b% in the solution

$$\text{Quantity of ingredient need to be added} = \frac{p(b-a)}{100-b}$$

Example

- 125 liter of mixture of milk and water contains 25% of water .How much water must be added to it to make water 30% in the new mixture?
- ={125(30-25)}/(100-30)
- =125*(5/70)
- = 8.92 liters

Different vessel - Equal size

- If n difrent vessels of equal size are filled with the mixture of P and Q in the ratio p1:q1,p2:q2,…..,pn:qn and the content of all these vessels are mixed in one large vessel, then

$$\frac{\text{Quantity of P}}{\text{Quantity of Q}} = \frac{\frac{p_1}{p_1+q_1} + \frac{p_2}{p_2+q_2} + \cdots + \frac{p_n}{p_n+q_n}}{\frac{q_1}{p_1+q_1} + \frac{q_2}{p_2+q_2} + \cdots + \frac{q_n}{p_n+q_n}}$$

Example

- Three equal buckets containing the mixture of milk and water are mixed into a bigger bucket .if the proportion of milk and water in the glass are 3:1, 2:3 and 4:2.then find the proportion of milk and water in the bigger bucket.

Different vessel - Different size

- If n different vessels of size x1,x2,….,xn are filled with the mixture of P and Q in the ratio p1:q1,p2:q2,…..,pn:qn and the content of all these vessels are mixed in one large vessel,then

$$\frac{\text{Quantity of P}}{\text{Quantity of Q}} = \frac{\frac{p_1 x_1}{p_1+q_1} + \frac{p_2 x_2}{p_2+q_2} + \cdots + \frac{p_n x_n}{p_n+q_n}}{\frac{q_1 x_1}{p_1+q_1} + \frac{q_2 x_2}{p_2+q_2} + \cdots + \frac{q_n x_n}{p_n+q_n}}$$

Example

- Three buckets of size 2 liter, 4 liter and 5 liter containing the mixture of milk and water are mixed into a bigger bucket.if the proportion of milk and water in the glass are 3:1, 2:3, and 4:2 .then find the proportion of milk and water in the bigger bucket.

Thank you