

Isotonic solutions

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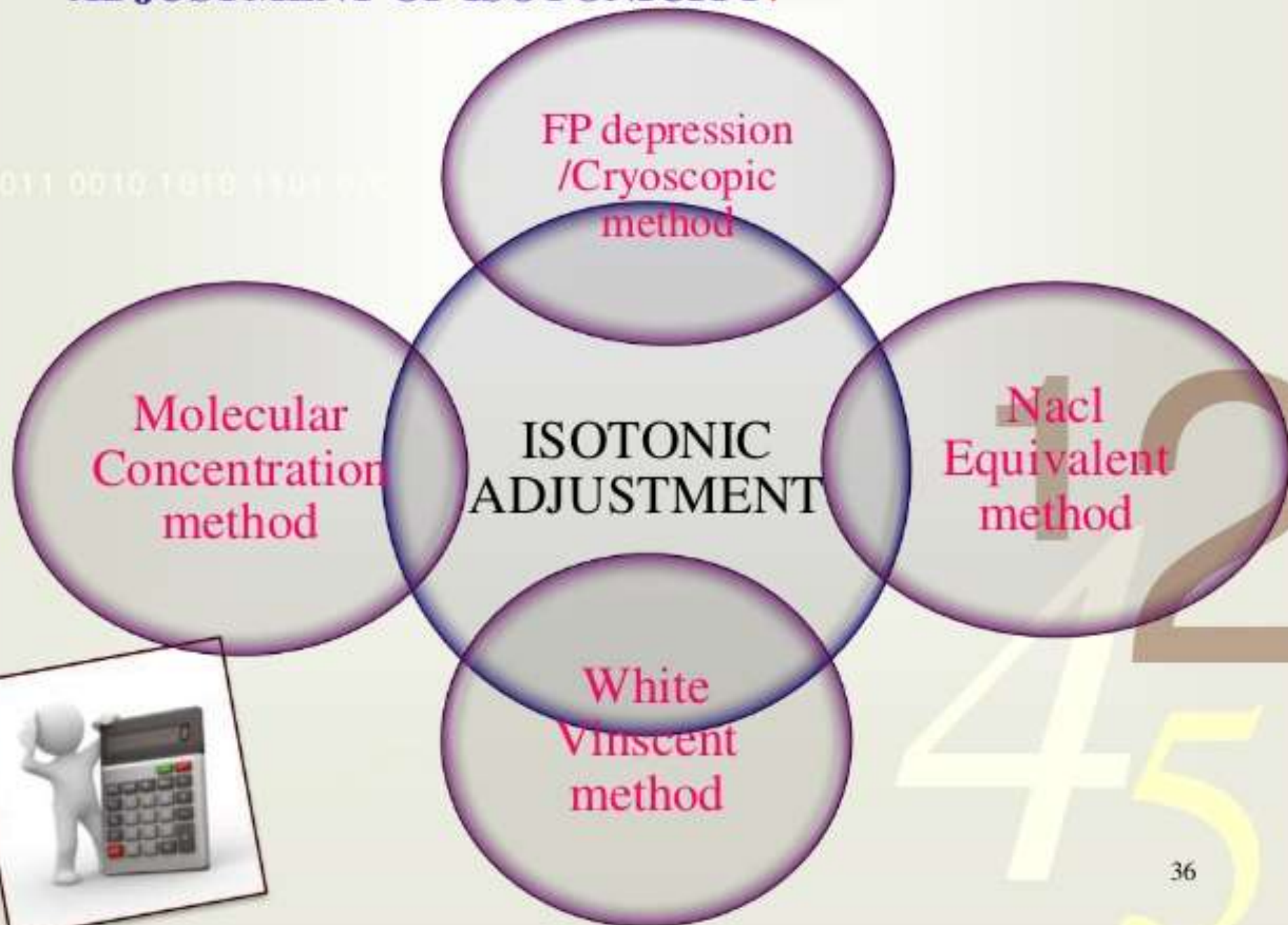
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Isotonic solutions

- Isotonic solutions are which have same osmotic pressure or equal solute concentrations.
- 0.9% sodium chloride solution is considered to passes the same osmotic pressure and hence it is a standard solution which is isotonic with blood plasma.
- Any concentration **above this (0.9%)** is considered as **hypertonic** and **below this (0.9%)** is considered as **hypotonic**.



ADJUSTMENT OF ISOTONICITY:



I. Freezing point method/ Cryoscopic method

$$\%w/v \text{ of adjusting substance needed} = \frac{0.52 - PSM * a}{b}$$

Where

PSM = percentage strength of medicament

a = Freezing point of the unadjusted solution

b = Freezing point of a 1% w/v solution of a adjusting substance



Example Problem for Freezing point method

- Using cryoscopic method. How will you prepare 1% solution of boric acid, iso osmotic with blood plasma.

[Hint : The freezing point of 1%w/v solution of boric acid is 0.288°C

The freezing point of 1%w/v solution of sodium chloride is 0.576°C]

$$\begin{aligned}\text{Percentage of w/v of sodium chloride required} &= \frac{0.52 - PSM * a}{b} \\ &= \frac{0.52 - 1 * 0.288}{0.576} \\ &= 0.402\% \text{ w/v}\end{aligned}$$



1 gm of boric acid is needed for 0.402 gm of NaCl to become isotonic.

2. Nacl Equivalent method:

$$\text{Quantity of Nacl required to adjust tonicity} = 0.9 - (\text{PSM} \times \text{E})$$

Where

PSM = Percentage strength of medicament.

E = Nacl equivalent (quantity of Nacl i.e., equivalent to 1gm of drug)

3. White Vincet method :

$$V = W \times E \times 111.1$$

Where

V = volume of isotonic solution in ml that can be prepared by dissolving drug in water

W = weight of the drug.

E = Nacl equivalent .



THANK YOU

