

**COLLEGE OF
PHARMACY**



جامعة الأمير سطام بن عبدالعزيز
Prince Sattam Bin Abdulaziz University

**STERILE PRODUCTS
PHT 434**

ADJUSTMENT OF TONICITY OF PARENTERAL SOLUTIONS

BY

SODIUM CHLORIDE EQUIVALENT METHOD

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OBJECTIVE OF LABORATORY

- *Adjustment of tonicity of parenteral solutions / electrolytes using sodium chloride (NaCl equivalent method).*

NaCl equivalent method

- It depends upon adjustment of tonicity of parenteral drug solution or electrolyte solution by **addition of NaCl**.
- **Sodium chloride equivalent of the parenteral drug solution or electrolyte solution**
(Amount of NaCl in gram that has same osmotic effect as 1% of drug).
- Sodium chloride equivalent of drugs are given in the question otherwise can be calculated.

NaCl equivalent method

Solution, 1% w/v drug	E
Apomorphine hydrochloride	0.14
Boric acid	0.50
Calcium gluconate	0.16
Pilocarpine nitrate	0.23
Potassium chloride	0.76
Sodium chloride	1.00
Sodium sulphacetamide	0.23

Steps involved in calculations

- Find out types of drug & its Liso value.
- Find out mol.wt. of drug.
- Calculate E_{NaCl} of drug

$$E_{NaCl} = \frac{17 L_{iso}(\text{drug})}{M.wt_{\text{drug}}}$$

- Put calculated E value in the formula below to find out % NaCl required to reach 0.9%.

$$w\% = 0.9 - (\text{drug}\% \times E_{NaCl})$$

- Add this calculated amount of NaCl and given % amount of drug in the volumetric flask.
- Add distilled water to make up the volume.

NaCl equivalent method

- Whenever Sodium chloride equivalent of the parenteral drug solution or electrolyte solution is not provided it can be calculated using following equation
- 1st calculate E_{NaCl}

$$E_{NaCl} = \frac{17 L_{iso}(\text{drug})}{M.wt_{\text{drug}}}$$

- Liso is a constant which depends on the type of drug and dissociation constant.
- If Liso value is not provided then it can be found by the types of drug as per **Table 1**

Liso values of substances

Type of substance	Examples	L iso values
Non-electrolytes	Sucrose, Urea, Propylene glycol	1.9
Weak- electrolytes	Boric acid, Phenobarbital	2.0
Di-divalent electrolytes	Zinc sulphate, Magnesium sulphate	2.0
Uni-univalent electrolytes	Sodiumchloride, Amphetaminehydrochloride	3.4
Uni- divalent electrolytes	Sodium sulphate, Atropine sulphate	4.3
Di- univalent electrolytes	Zinc chloride, Calcium bromide	4.8
Uni- trivalent electrolytes	Sodium phosphate, Sodium citrate	5.2
Tri- univalentelectrolytes	Aluminum chloride, ferric iodide	6.0
Tetra borate- electrolytes	Sodium borate, potassium borate	7.6

NaCl equivalent method

- After finding out Liso value of given drug its sodium chloride equivalent can be calculated as follow
- 1st calculate E_{NaCl}

$$E_{NaCl} = \frac{17 L_{iso}(\text{drug})}{M.wt_{\text{drug}}}$$

- Put calculated E value in the formula below to find out % NaCl required to reach 0.9%

$$w\% = 0.9 - (\text{drug}\% \times E_{NaCl})$$

*THANK YOU FOR
ATTENTION*

GOOD LUCK ..