Injectable Medications & IV Fluids mMole, mEq, mOsm

Part I

Chapter 12

Please review chapter 9

Objectives

- Calculate the concentration in millimols, milliequivalents & milliosmols.
- Calculate the electrolyte weight required to prepare a solution with a desired millimols, milliequivalents or milliosmols.
- Convert from mg% to millimols and milliosmols and vice versa.

Milliequivalent

- What is the concentration in milligrams/mL of a solution containing 10 mEq of KCl /5mL
- MWt of KCl 74.5

Milliequivalent

- What is the concentration in mg/mL of a solution containing 4 mEq of calcium chloride ($CaCl_2.2H_2O$)/mL.
- Mwt of $CaCl_2$ di-hydrate is 147
- Mwt of $CaCl_2$ is 111

Osmolarity and Osmolality

- What is the osmolarity of 0.9% NaCl solution (MWt 58.5)?

Osmolarity and Osmolality

- 2 common ways of expressing Osmol **concentration** are osmolarity and osmolality.
- Osmolarity = # of Osm/ L of solution
- Osmolality = # of Osm/ Kg of water
- At very diluted solutions

osmolarity = osmolality

Osmolarity and osmolality

Osmolarity or Osmolality?

- 30 mOsm in 100 mL solution 300 mosmo**lar**
- 43 mOsm in 10 mL water 4300 mOsmolal
- 0.67 mOsm /mL solution …… mosmolar
- 1 mOsm /gram water mOsmolal

- To convert from osmolarity to osmolality you need to know specific gravity.

Extra problem

- How many milliequivalents of Na^+ are there in 50 mL dose of the following solution?

Rx		Mwt
$Na_2HPO_4.7H_2O$	20 gram	268
$NaH_2PO_4.H_2O$	40 gram	138
Water qs ad	100 mL	

Atomic weight: Na =23, P= 31, O=16, H=1

Extra problem

- How many milliequivalents of Na^+ are there in 50 mL dose of the following solution?

Rx			Mwt
$Na_2HPO_4.7H_2O$	20 gram	10 g	268
$NaH_2PO_4.H_2O$	40 gram	20 g	138
Water qs ad	100 mL	50 ml	

mEq= (10000mg/268)X 2= 74.6 mEq

mEq= (20000mg/138) x 1 = 144 mEq

Total mEq= 218.6

Atomic weight: Na =23, P= 31, O=16, H=1

Application 1

- Calculate the milliequivalents of sodium, potassium and chloride, the millimoles of dextrose and the osmolarity of the following parenteral solution:

  Rx

  Dextrose 50 g

  Sodium Chloride 4.5g

  Potassium Chloride 1.49 g

  SWFI ad 1000 mL

MWt
180
58.5
74.5

Extra problems

1. How many mEq/Liter are present in a solution containing 10 mg% of $CaCl_2$ ions?
2. How many grams of magnesium chloride should be used to prepare 120 mL of a solution intended to contain 3 mEq of magnesium ion / 10 mL (MWt 95)?
3. What is the percentage strength of 200 mOsmolar potassium chloride solution?

Extra problem

- You prepared **10** mL of 10% solution of magnesium acetate ($C_4H_6MgO_4$) for a patient.

1-How many millimols, milliequivalents (of Mg^{+2}) will the patient receive?

2- What is the # mOsmol?

(MWt 142).

Application 2

- Calculate the number of mOsmols in a 700 mL of normal saline solution.

- Calculate the number of mOsm/L in a solution of 5% dextrose (M Wt 198) and 0.2% sodium chloride.

Common mistakes

mEq, versus mOSm. (valence or # of species).

Calculate the # or Osm, mOsm versus osmolarity.

Calculating the molecular weight of anhydrous and hydrates.