ABSTRACT

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Concentraction of the dissolved substances in parenteral solutions, which is involved in osmotic pressure of the preparation, is expressed as osmolarity (mosmol · l^{-1}). This better complies to practical application and relates to molar concentration (mol · l^{-1}). However, osmolarity cannot be measured, while osmolality (mosmol · kg^{-1}) can.

In this work, density at 20°C and osmolality of aqueous solutions of sodium chloride, potassium chloride and ammonium chloride with molal concentration in a range 0,1 - 1,0 mol · kg^{-1} and/or molar concentration in a range 0,1 - 1,0 mol · l^{-1}, respectively, were measured. The experimental data were used to estimate osmolarity. Molal osmotic factors of the dissolved solutes in molal solutions were expressed. The values decreased when the concentration increased.

Estimation of the actuall osmolarity requires knowledge of the solutions density and the partial molal volume of the dissolved solute. No differences were observed when derived it from molal and/or molar solution concentration. Therefore, the average values of partial molal volume would be recommended for estimation of the actual osmolarity. Out of studied methods of conversion of the experimentally obtained osmolality to osmolarity, the equation (11) provides the most exact results for all investigated solutes.

At isotonic concentrations of the solution of sodium chloride, potassium chloride and amonium chloride, the differences between osmolality and osmolarity can be neglected. At the high concentration solution, the differences might lead to danger for a patient. In conclusion, it could be recommended labeling of parenteral solutions with the solution density and the measured osmolality.