Urine osmolality/stanovení

Osmometer

Osmosis is used to accurately determine osmolality. They take advantage of the fact that dissolved particles affect some properties of the solution:

- reduce the freezing point of the solution (**cryoscopic** principle);
- increase the boiling point of the solution (**ebulioscopic** principle);
- reduce the vapor pressure of the solvent above the solution.

The magnitude of the change in the above quantities depends on the concentration of osmotically active substances in the measured solution, and osmometers record these changes with great accuracy. A decrease in freezing point is usually observed. It is true that 1 mole of particles of a substance dissolved in 1 kg of water reduces its freezing point by 1.86 ° C.

Indicative calculation based on Na^+ , K^+ , NH_4^+ and urea urea concentration values

> Urine osmolality = 2 ($[Na^+]$ + $[K^+]$ + $[NH_4^+]$) + [urea]

This calculation fails if the urine contains a high concentration of other substances that are physiologically present in orders of magnitude lower amounts - for example in severe glycosuria or ketonuria .

By approximate calculation from the value of relative density

If urine does not contain protein or sugar

multiply the last two digits of the relative density value by a factor of 33.

Relative urine density = 1,019 → Osmolality estimate: 19 · 33 = 627 mmol / kg.

if urine contains protein or sugar
> we must first correct the relative density value
>
> - in the presence of protein for every 10 g / l we subtract from the value of relative density 0.003;
> - in the presence of glucose for every 10 g / l we subtract from the value of relative density 0.004.