

Pharmaceutical

- ◆ **Ophthalmology Products:**
By maintaining critical osmolality parameters, morphological changes are prevented in both vitreous tissue and permeable intra-ocular lenses and solutions.
- ◆ **Hospital Pharmacy:**
Many pharmaceutical admixtures benefit by being monitored to assure consistency and correct formulation, including infant formulae and parenterals, electrolyte solutions, cardioplegic solutions and antineoplastic agents.
- ◆ **Research and Development:**
Osmometers provide R&D the capability of testing products under development for bio-compatibility. Continued monitoring with an osmometer during manufacturing and as part of a quality control initiative assure consistency and product effectiveness.

Manufacturing

- ◆ **Fluid Manufacture:**
In the manufacture of reagents, standards, media, or any other type of biological, osmolality is an easy, effective check for consistency and quality.
- ◆ **Cosmetics:**
Just as an osmometer is an effective tool in the development and manufacture of pharmaceuticals, osmometry is just as effective in development, manufacture and quality control of cosmetics.

Research

- ◆ **Water Activity Studies:**
Each solute affects the freezing point/osmolality of water in a slightly different, non-linear manner. In order to precisely determine its concentration, one must know the osmotic coefficient/water activity as well as the freezing point/osmolality.

Food and Beverage

- ◆ **Corn Sweeteners and Malto Dextrins:**
Production of sweeteners and specialty starches by hydrolysis can be rapidly monitored with osmometry, reducing lag time and eliminating variation.
- ◆ **Ice Cream:**
Ice cream mixtures can be easily and rapidly monitored with an osmometer or cryoscope as part of a quality control check.
- ◆ **Brewing and Malting:**
Predict end fermentation by monitoring freezing point. Microbrewery operations producing limited output, high quality products benefit from this "real-time" testing.
- ◆ **Reduced-Lactose Dairy Products:**
Enzymatic lactose reduction is easily monitored with an osmometer or cryoscope.
- ◆ **Sports Beverages:**
For sports beverages to offer maximum benefit to an athlete, their osmolality must not exceed that of normal body fluids. Solutions with an osmolality greater than this cause water to be drawn from the body to the stomach to balance osmolality and in doing so negatively impact the athlete's performance. Ingredient manufacturers of isotonic sports beverages recommend checking the osmolality of all mixes.

Environmental

- ◆ **Water Analysis:**
Measuring osmolality of a water sample by freezing point depression allows a rapid, inexpensive analysis of contamination of drinking water, surface water, brines and industrial waste discharges and aids field investigators in characterizing the severity of pollution.

Aquaculture and Oceanography

- ◆ **Smoltification:**
More careful monitoring of the salt water challenge for anadromous species helps reduce holding time for smolts. The small sample required and whole blood capability of an osmometer permits diagnostic work to be done on individual rather than pooled specimens.
- ◆ **Habitat Monitoring:**
Salinity studies for water mass, estuary flow, and effluence can be done by osmometry.

Tissue Culture

- ◆ **Media:**
Media for culture of both animal and plant tissue should be tested for osmolality before use since lot-to-lot variations can occur whether media is reconstituted or purchased ready-to-use.
- ◆ **Separation:**
Density gradient materials for separations should be iso-osmotic. Significantly enhanced yields of many cell lines from careful monitoring have been reported.
- ◆ **Fixation:**
Imaging by SEM and TEM requires morphologic integrity—most easily assured by osmolality testing of fixatives.

Embryology

- ◆ **Human:**
ASRM/CAP Guidelines for Human Embryology Laboratories specify that an osmometer be used in culture media production.
- ◆ **Agricultural/Zoological:**
Just as in human embryology, plant and animal in vitro fertilization benefits from checking media with an osmometer.