

# Osmolality in Serum and Urine

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# -Osmolality and Osmolarity:

- **Osmolality** is the concentration of a solution in terms of osmoles of solutes per **kilogram** of **solvent**.  
→ expressed as (**Osm/kg**).
- **Osmolarity** is the concentration of a solution in terms of osmoles of solutes per **liter** of **solution**.  
→ expressed as (**Osm/L**).

# -Osmolality test:

- The osmolality test provides a snapshot of the **number of solutes** present in the blood (serum), urine, or stool.

# -Osmometer:

- Is a device for measuring the osmotic strength of a solution.
- **Types of osmometers:**
  1. **Membrane Osmometers:** measure the osmotic pressure of a solution separated by a semi-permeable membrane.
  2. **Vapor Pressure Osmometers:** determine the concentration of osmotically active particles that reduce the vapor pressure of the solution.
  3. **Freezing Point Osmometer:** determine the osmotic strength of solution by utilizing freezing point depression.

# -Serum osmolality:

- Serum osmolality is primarily ordered to investigate **hyponatremia** (low sodium in serum).
- **Normal:**     **Adults:** 280–303 mOsm/kg H<sub>2</sub>O

	Cause
Higher than normal levels ( <b>hyperosmolality</b> )	<ul style="list-style-type: none"><li>• Dehydration.</li><li>• Azotemia.</li><li>• Chronic renal disease .</li><li>• High sodium level (<b>hypernatremia</b>).</li><li>• Diabetes mellitus.</li><li>• Diabetes insipidus.</li></ul>
Lower than normal levels ( <b>hypoosmolality</b> )	<ul style="list-style-type: none"><li>• Loss of sodium with diuretics and low-salt diet (<b>hyponatremia</b>).</li><li>• Syndrome Inappropriate ADH secretion (SIADH).</li><li>• Excess hydration</li></ul>

# -Urine osmolality:

- Urine osmolality is frequently ordered along with serum osmolality.
- This test helps check your **body's water balance** and **urine concentration**.
- **Osmolality** is a **more exact** measurement of urine concentration than the urine **specific gravity test**.
- **Normal:** **24-hour:** 300–900 mOsm/kg H<sub>2</sub>O , **Random:** 50–1400 mOsm/kg H<sub>2</sub>O

	Cause
Higher than normal levels ( <b>hyperosmolality</b> )	<ul style="list-style-type: none"><li>• Dehydration.</li><li>• Pre-renal azotemia.</li><li>• Glycosuria.</li><li>• Syndrome Inappropriate ADH secretion (SIADH).</li><li>• Hyponatremia</li></ul>
Lower than normal levels ( <b>hypoosmolality</b> )	<ul style="list-style-type: none"><li>• Excessive fluid intake.</li><li>• Diabetes insipidus.</li><li>• Acute renal insufficiency.</li><li>• Hypernatremia.</li></ul>

## -References :

- <http://www.nlm.nih.gov/medlineplus/ency/article/003463.htm>
- Agasti TK, Textbook of Anesthesia for Postgraduates, JP Medical Ltd .p. 238.
- Fischbach FT, Dunning MB. A Manual of Laboratory and Diagnostic Tests. Lippincott Williams & Wilkins, 2009.