

Osmolality in Serum and Urine

-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 H₂O

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

-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 H₂O , **Random:** 50–1400 mOsm/kg H₂O

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

-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.