

University of Alzahraa for women

College of pharmacy



Biochemistry

Third Stage

Chemical Examination of Urine

- Chemical examination of urine includes the identification of:

Protein, blood cells, glucose, pH, bilirubin, urobilinogen, ketone bodies, nitrites, and leukocyte.

Normally, kidney excrete scant amount of protein in urine (< 150 mg/24h).

These proteins include

- Protein from plasma (albumin)
- Protein derived from urinary tract
 - Tamm-Horsfall protein*
 - Secretory IGA
 - Protein from tubular epithelial cells.

Proteinuria refers to protein excretion in urine >150 mg/24h in adults.

Causes:

- Glomerular proteinuria: due to increased permeability of glomerular capillary wall.
- Tubular proteinuria: due to decreased tubular reabsorption of filtered proteins.
- Overflow: due to increased production of low molecular weight proteins.

Albuminuria

- A urine microalbuminuria test is a test to detect very small levels of a blood protein (albumin) in your urine.
- A microalbuminuria test is used to detect early signs of kidney damage in people who are at risk of developing kidney diseases.

- Urinary excretion of 30 to 300 mg/24hr (or 2-20mg/dl) of albumin in urine.
 - Measurement of albumin-creatinine ratio in random urine sample
 - Measurement of albumin in an early morning or random sample.
 - Measurement of albumin in a 24hr sample.
 - Test strips that screen for microalbuminuria.

Tests for Protein

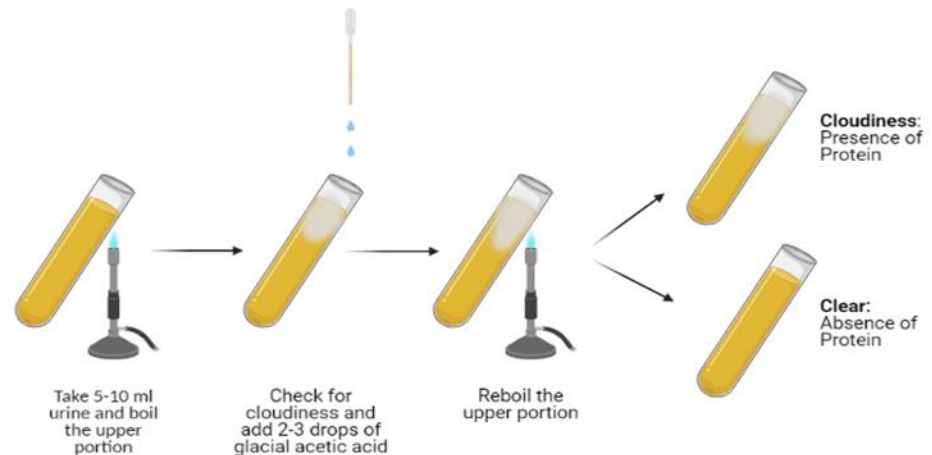
- Heat and acetic acid test
- Sulfosalicylic acid test
- Heller's test
- Dipstick method

Heat and Acetic Acid Test

- Principle:
- Heat induced coagulation of proteins and precipitation. Coagulation can further enhanced when drops of acetic acid are added.

Procedure:

- Fill three-fourth of a test tube with clear urine.
- Heat the upper part of the urine.
(lower part of the urine acts as a control)
- Add a few drops of (3-5) 10% glacial acetic acid.



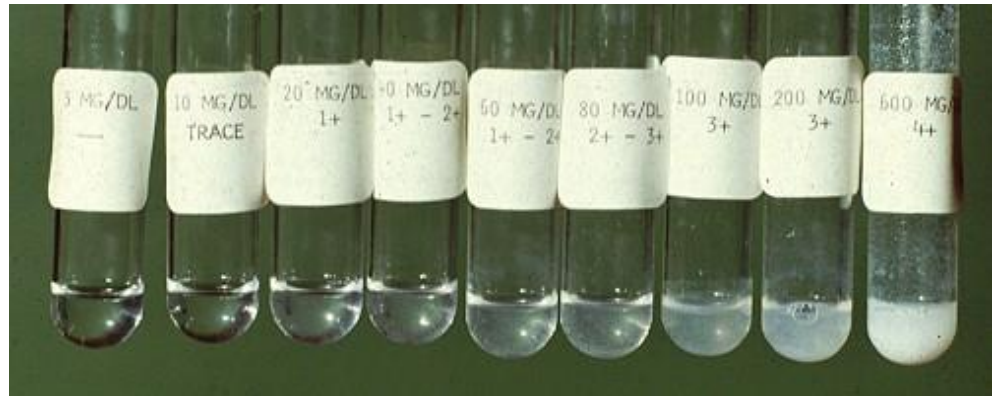
Interpretation:

- If turbidity persists its due to proteins.
- Depending upon the amount of precipitate, results are interpreted below....

Description	Result	Approximate protein concentration
No cloudiness/ precipitate	Negative	–
White cloudiness	+	<100 mg/dl
Granular white precipitate	++	100-250 mg/dl
Floccular precipitate	+++	250-500 mg/dl
Thick opaque precipitate	++++	500 mg/dl

Sulfosalicylic acid test

- This test detects all types of proteins (Albumin, globulin, glycoprotein and Bence Jones protein).
- **Principle:** Precipitation of proteins by a strong acid.



Procedure

- Take 2.5 ml pf urine in a small test tube.
- Slowly pour 2.5 ml of sulfosalicylic acid.
- Wait for 5 min.

Interpretation

- Presence of a cloudy precipitate indicates the presence of proteins in urine.
- However, it also precipitates mucus and Bence Jones protein.
- Caution: filter urine if turbid, as it interferes with the final reading.

Dipstick method

Principle:

The reagent area of the strip is coated with bromophenol blue indicator and buffered to an acid pH which changes color in the presence of proteins.

Procedure:

Bromophenol coated strip is dipped in urine. Change in color of strip indicates presence of proteins in urine.



Thank you for listening