



# EXPERIMENT

10

## Aim

To test the presence of urea in urine.

## THEORY

Urea is mainly excreted out of the body into urine through kidneys. Nitrogen present in amino acids is removed as urea. Normally a healthy adult excretes about 15 g of nitrogen per day, 95% of this is excreted as urea in urine. The amino groups of amino acids are ultimately removed as ammonia ( $\text{NH}_3$ ).

This  $\text{NH}_3$  is highly toxic and is ultimately converted into urea. Urea is formed in the liver from ammonia and  $\text{CO}_2$ . Its excretion in urine is dependent on amount of protein ingested. The presence of urea in the urine is tested by Sodium hypobromite test and urease test.

## MATERIAL REQUIRED

Urine sample, test tubes, test tube stand, test tube holder, spirit lamp, water, sodium hypobromite, phenol red, dilute sodium hydroxide, 2% acetic acid, urease tablet, 1%  $\text{CuSO}_4$  solution and 2%  $\text{Na}_2\text{CO}_3$  solution.

## PROCEDURE AND OBSERVATIONS

### 1. Sodium Hypobromite Test

- (i) Take 2 ml of urine sample in a test tube.
- (ii) Add 3 to 5 drops of sodium hypobromite solution in it.
- (iii) Brisk effervescence of nitrogen appears in the test tube, which indicates the presence of urea in the sample.

### 2. Urease Test

- (i) Take 2 ml of urine in one test tube and 2 ml of water in other test tube.
- (ii) Add a drop of phenol red indicator to each tube.
- (iii) Add 2%  $\text{Na}_2\text{CO}_3$  solution drop by drop till the pink colour appears in both the test tubes and the solution becomes alkaline in nature.
- (iv) Now, add 2% acetic acid to the test tubes drop by drop till the pink colour disappears turning it into an acidic solution.
- (v) Add half of a urease tablet in powdered form to the sample and rotate the tube between the palms or warm the tubes to about  $60^\circ\text{C}$ . Repeat this step with the other test tube as well.
- (vi) The solution which contains urine turns pink, thus indicating the presence of urea in the sample.

## RESULT

The above tests show that the given sample of urine contains urea.

## PRECAUTIONS

1. Use standard reagents to get good results.
2. Fresh sample of urine should be used because if the urine is kept exposed to the atmosphere, it splits and ammonia is released.

3. Heating must be done carefully and by using test tube holder.
4. Overheating should be avoided to prevent denaturation of enzyme.
5. Required number of reagents should be used to prevent false positive results.

## VIVA VOCE

**Q1. Name some normal constituents of urine.**

**Ans.** The normal constituents of urine are urea, uric acid, creatinin hippuric acid, NaCl, traces of minerals, some traces of vitamins (B and C), oxalic acid, etc.

**Q2. Which pigment imparts colour to urine?**

**Ans.** Urochrome mainly, but urobilin and urythrin are also present

**Q3. What is the main nitrogenous organic substance present in urine?**

**Ans.** Urea

**Q4. Give the composition of urine.**

**Ans.** The composition of urine can be given as:

(i) Water 95 - 96%

(ii) Urea - 2%

(iii) Dissolved substances - 2 degrees (contains sugar, albumin, ketone bodies, bile salts, etc.)

**Q5. What is the other name of hypobromite ion?**

**Ans.** Hypobromite ions are also known as alkaline bromine water ( $\text{BrO}^-$ ).

**Q6. Which bond in urea is responsible for the colour production in biuret test?**

**Ans.** The amide bond in urea is responsible for the colour production in biuret test.

**Q7. In which organ of our body highly toxic ammonia is converted into urea?**

**Ans.** Ammonia is converted into urea in the liver.

**Q8. Name the disorder that shows the presence of excess urea in the urine.**

**Ans.** Uremia is the disorder, which shows the presence of excess urea in the urine.