

Urine pH

Urine pH is used to classify urine as either a dilute acid or base solution. Seven is the point of neutrality on the pH scale. The lower the pH, the greater the acidity of a solution; the higher the pH, the greater the alkalinity. The glomerular filtrate of blood is usually acidified by the kidneys from a pH of approximately 7.4 to a pH of about 6 in the urine. Depending on the person's acid-base status, the pH of urine may range from 4.5 to 8. The kidneys maintain normal acid-base balance primarily through the reabsorption of sodium and the tubular secretion of hydrogen and ammonium ions. Urine becomes increasingly acidic as the amount of sodium and excess acid retained by the body increases. Alkaline urine, usually containing bicarbonate-carbonic acid buffer, is normally excreted when there is an excess of base or alkali in the body. Secretion of an acid or alkaline urine by the kidneys is one of the most important mechanisms the body uses to maintain a constant body pH.

A highly acidic urine pH occurs in:

- Acidosis
- Uncontrolled diabetes
- Diarrhea
- Starvation and dehydration
- Respiratory diseases in which carbon dioxide retention occurs and acidosis develops

A highly alkaline urine occurs in:

- Urinary tract obstruction
- Pyloric obstruction
- Salicylate intoxication
- Renal tubular acidosis
- Chronic renal failure
- Respiratory diseases that involve hyperventilation (blowing off carbon dioxide and the development of alkalosis)

In people who are not vegetarians, the pH of urine tends to be acidic. A diet rich in citrus fruits, legumes, and vegetables raises the pH and produces urine that is more alkaline. Most of the bacteria responsible for urinary tract infections make the urine more alkaline because the bacteria split urea into ammonia and other alkaline waste products. The urine pH varies in different types of acidosis and alkalosis. Control of pH is important in the management of several diseases, including bacteriuria, renal calculi, and drug therapy.

The formation of renal stones is related to the urine pH. Patients being treated for renal calculi are frequently given diets or medications to change the pH of the urine so that kidney stones will not form. Calcium phosphate, calcium carbonate, and magnesium phosphate stones develop in alkaline urine; when this occurs, the urine is kept acidic. Uric acid, cystine, and calcium oxalate stones precipitate in acidic urine; in this situation, the urine should be kept alkaline or less acidic than normal. Drugs such as streptomycin, neomycin, and kanamycin are effective in treating urinary tract

infections if the urine is alkaline. During treatment with sulfa drugs, alkaline urine helps prevent formation of sulfonamide crystals.

Here are important points to remember about urinary pH:

- An accurate measurement of urinary pH can be done only on a freshly voided specimen. If urine must be kept for any length of time before analysis, it should be refrigerated.
 - During sleep, decreased pulmonary ventilation causes respiratory acidosis. As a result, a first waking urine specimen is usually highly acidic.
 - Bacteria causing a urinary tract infection or bacterial contamination will produce alkaline urine.
 - A diet rich in citrus fruits, most vegetables, and legumes will keep the urine alkaline.
 - A diet high in meat and cranberry juice will keep the urine acidic.
 - Urine pH is an important screening test for the diagnosis of renal disease, respiratory disease, and certain metabolic disorders.
 - If urine pH is to be useful, it is necessary to use pH information in comparison with other diagnostic information.
-

Instant Feedback:

Most bacterial urinary tract infections cause the urine to become more alkaline.

TRUE or FALSE
