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**ASSIGNMENT TITLE: RENAL PHYSIOLOGY**

Question

Write a short note on the characteristics and components of urine.

Characteristics of Urine

Urine is typically yellow or amber in color. The yellow color is created by urochrome, a pigment produced from the breakdown of bile (the yellowish fluid secreted by the liver to digest fats). The color of urine may change depending on fluid levels in the body and on the types of foods ingested. A deficiency of fluid in the body forces the kidneys to absorb more water, creating a more concentrated, darker-colored urine. Too much fluid in the body results in a more dilute, lighter-colored urine. If the urine turns green or red, it may simply be because a person's diet included asparagus, beets, foods containing dyes, or certain medications. A change in color alone is usually no cause for concern, but the presence of pinkish or red blood in the urine (hematuria) can be a sign of disease (like kidney stones) or infection.

Normal, healthy urine is clear immediately after urination, but becomes cloudy when left standing. Likewise, urine does not have a strong smell as it leaves the body, but when left outside for any length of time, it develops an ammonia-like odor. This occurs because of the process in which the liver breaks down proteins. Referring back to the discussion on waste removal in the kidney function section of this chapter, the breakdown of proteins releases ammonia, which is too toxic

for the body to handle. Ammonia is converted into the less toxic urea before it is sent to the kidneys for filtration. But when urea in the urine is exposed to oxygen in the air, it converts back to ammonia, which explains the strong odor. If the urine has a strong, foul smell immediately after leaving the body, it may be the result of bacteria from a urinary tract infection. In diabetics, urine will have a sweet, fruity smell because it contains excess ketone bodies.

The normal pH of urine ranges from 4.5 to 8.0, averaging around 6.0. The more acid the body retains, the more acidic the urine. Certain conditions may lead to overly acidic urine, including uncontrolled diabetes, diarrhea, dehydration, and acidosis (an abnormal increase in acidity when blood pH drops below 7.35). Urine tends to be more alkaline when an individual suffers from urinary tract obstruction or chronic kidney failure. A vegetarian diet can also make the urine more alkaline

Volume : 1,000 to 1,500 mL/day

Reaction : Slightly acidic with pH of 4.5 to 6

Specific gravity : 1.010 to 1.025

Osmolarity : 1,200 mOsm/L

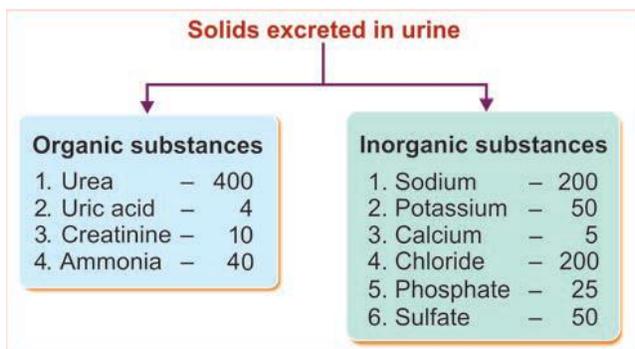
Color : Normally, straw colored

Odor : Fresh urine has light aromatic odor.

If stored for some time, the odor becomes stronger due to bacterial decomposition.

## COMPOSITION OF URINE

Urine consists of water and solids. Solids include organic and inorganic substances .



Because the human body is composed of about 50 to 70 percent water, it makes sense that the urine is made up primarily of water. In fact about 95 percent of urine is water. The remainder is made up of dissolved wastes, including urea, creatinine, uric acid, and ketone bodies.

The urine may also contain small amounts of substances the body normally uses, like sodium, potassium, and calcium. If the bloodstream contains excessive amounts of these nutrients, the kidneys will excrete the leftover portion into the urine. Other substances may end up in the urine that signal a problem within the body. The presence of protein or white blood cells during a urinalysis may indicate an infection or inflammation of the kidneys. Glucose in the urine may signal diabetes.

The volume and concentration of water in the urine are determined by how much water is reabsorbed as the filtrate passes through the end of the distal convoluted tubules and collecting ducts on the final leg of the urine production process, as controlled by the antidiuretic hormone (ADH)

If the body is dehydrated, more ADH is produced, making the cells more permeable to water. As more water is reabsorbed by the kidneys, the urine becomes more concentrated. If there is too much water in the body, less ADH will be produced, and water will not be reabsorbed in the distal convoluted tubules and collecting ducts, making the urine more dilute.