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

Urine is a sterile waste product composed of water soluble nitrogen products. Urine is a liquid by-product of metabolism in humans and in many other animals. Urine flows from the kidneys through the ureters to the urinary bladder. Urination results in urine being excreted from the body through the urethra.

Cellular metabolism generates many by-products that are rich in nitrogen and must be cleared from the bloodstream, such as urea, uric acid, and creatinine. These by-products are expelled from the body during urination, which is the primary method for excreting water-soluble chemicals from the body. A urinalysis can detect nitrogenous wastes of the mammalian body.

Physical Characteristics

Physical characteristics that can be applied to urine include color, turbidity (transparency), smell (odor), pH (acidity – alkalinity) and density. Many of these characteristics are notable and identifiable by vision alone, but some require laboratory testing.

1. Color: Typically yellow-amber, but varies according to recent diet and the concentration of the urine. Drinking more water generally tends to reduce the concentration of urine, and therefore causes it to have a lighter color. Dark urine may indicate dehydration. Red urine indicates red blood cells within the urine, a sign of kidney damage and disease. Urine varies in appearance, depending principally upon a body's level of hydration, as well as other factors. Normal urine is a transparent solution ranging from colorless to amber but is usually a pale yellow. In the urine of a healthy individual, the color comes primarily from the presence of urobilin. Urobilin is a final waste product resulting from the breakdown of heme from hemoglobin during the destruction of aging blood cells.

Colorless urine indicates over-hydration, generally preferable to dehydration (though it can remove essential salts from the body). Colorless urine in drug tests can suggest an attempt to avoid detection of illicit drugs in the bloodstream through over-hydration.

Dark yellow urine is often indicative of dehydration.

Yellowing/light orange may be caused by removal of excess B vitamins from the bloodstream.

Certain medications such as rifampin and phenazopyridine can cause orange urine.

Bloody urine is termed hematuria, a symptom of a wide variety of medical conditions.

Dark orange to brown urine can be a symptom of jaundice, rhabdomyolysis, or Gilbert's syndrome.

Black or dark-colored urine is referred to as melanuria and may be caused by a melanoma or non-melanin acute intermittent porphyria.

Pinkish urine can result from the consumption of beets.

Greenish urine can result from the consumption of asparagus or foods or beverages with green dyes.

Reddish or brown urine may be caused by porphyria (not to be confused with the harmless, temporary pink or reddish tint caused by beeturia).

Blue urine can be caused by the ingestion of methylene blue (e.g., in medications) or foods or beverages with blue dyes.

Blue urine stains can be caused by blue diaper syndrome.

Purple urine may be due to purple urine bag syndrome.

2. Smell: The smell of urine may provide health information. For example, urine of diabetics may have a sweet or fruity odor due to the presence of ketones (organic molecules of a particular structure) or glucose. Generally fresh urine has a mild smell but aged urine has a stronger odor similar to that of ammonia. Eating asparagus can cause a strong odor reminiscent of the vegetable caused by the body's breakdown of asparagusic acid. Likewise consumption of saffron, alcohol, coffee, tuna fish, and onion can result in telltale scents.[citation needed] Particularly spicy foods can have a similar effect, as their compounds pass through the kidneys without being fully broken down before exiting the body.
3. The pH of normal urine is generally in the range 4.6 – 8, with a typical average being around 6.0. Much of the variation occurs due to diet. For example, high protein diets result in more acidic urine, but vegetarian diets generally result in more alkaline urine (both within the typical range of 4.6 – 8).
4. Density: Density is also known as “specific gravity.” This is the ratio of the weight of a volume of a substance compared with the weight of the same volume of distilled water. The density of normal urine ranges from 0.001 to 0.035.

5. Turbidity: The turbidity of the urine sample is gauged subjectively and reported as clear, slightly cloudy, cloudy, opaque or flocculent. Normally, fresh urine is either clear or very slightly cloudy. Excess turbidity results from the presence of suspended particles in the urine, the cause of which can usually be determined by the results of the microscopic urine sediment examination. Common causes of abnormal turbidity include: increased cells, urinary tract infections or obstructions.

Abnormalities in any of these of physical characteristics may indicate disease or metabolic imbalances. These problems may seem superficial or minor on their own, but can actually be the symptoms for more serious diseases, such as diabetes mellitus, or a damaged glomerulus.

Normal Chemical Composition of Urine

Urine is an aqueous solution of greater than 95% water, with a minimum of these remaining constituents, in order of decreasing concentration:

Urea 9.3 g/L.

Chloride 1.87 g/L.

Sodium 1.17 g/L.

Potassium 0.750 g/L.

Creatinine 0.670 g/L.

Other dissolved ions, inorganic and organic compounds (proteins, hormones, metabolites).