

URINE CHARACTERISTICS

Urinalysis	
Color:	Pale yellow
Odor:	Aromatic odor
Turbidity:	Clear
Specific gravity:	1.016 to 1.022
pH:	4.5 to 7.8
Protein:	Negative
Ketones:	Negative
Bilirubin:	Negative
Glucose:	>0.5 g/day
Red blood cells:	< 3 cells/HPF
White blood cells:	< or = 4 cells/HPF
Bacteria:	None or >1000/ml
Casts:	None to few
Crystals:	None
Uric acid:	250 to 750 mg/24 hours
Sodium:	40 to 220 mEq/24 hours
Potassium:	25 to 125 mEq/24 hours
Magnesium:	7.3 – 12.2 mg/dL

Table 1: Characteristic changes in urine color

Color	Causing substance	Occurrence
Yellow to colorless		<ul style="list-style-type: none"> increased diuresis in excessive drinking diuretic drugs diabetes mellitus diabetes insipidus polyuric phase of renal failure
Brown	bilirubin	<ul style="list-style-type: none"> diseases of liver and biliary tract
Green-brown	biliverdin (originates from bilirubin by oxidation on air) – old urine	<ul style="list-style-type: none"> diseases of liver and biliary tract
Yellow-orange	riboflavin, carotenes	<ul style="list-style-type: none"> exogenous intake
Meat red (without turbidity)	hemoglobin myoglobin porphyrins beetroot	<ul style="list-style-type: none"> intravascular hemolysis burns necrosis of muscles inflammation of muscles porphyrias exogenous intake
Meat red (with turbidity)	blood in urine - macroscopic hematuria (microscopic hematuria, which is demonstrable only by chemical or microscopic examination, does not affect color of urine)	<ul style="list-style-type: none"> diseases of kidney and urinary tract disorders of hemostasis bleeding to urinary tract
Dark brown (turns black upon standing on air)	melanin homogentisic acid	<ul style="list-style-type: none"> melanoma alkaptonuria
Light red	urates	<ul style="list-style-type: none"> hyperuricosuria

Table 2: Smell of urine

Smell	Cause	Occurrence
<i>Ammonia</i>	presence of bacteria producing urease, an enzyme catalysing decomposition of urea to ammonia and water	<ul style="list-style-type: none"> old urine sample infections of urinary tract diseases with chronic urine retention (e.g. adenoma of prostate)
<i>Acetone (overripe apples)</i>	excretion of acetone in ketoacidosis	<ul style="list-style-type: none"> diabetes mellitus starvation
<i>Maple syrup or 'maggi' spice</i>	branched chain carboxylic oxoacids (especially 2-oxoisocaproic, 2-oxoisovaleric acids)	<ul style="list-style-type: none"> leucinosi (maple syrup disease)
<i>Hydrogen sulfide, or even putrescent</i>	bacterial decomposition of proteins releases H ₂ S from sulfur-containing amino acids	<ul style="list-style-type: none"> infections of urinary tract associated with proteinuria cystinuria
<i>Mouse</i>	phenylacetate	<ul style="list-style-type: none"> phenylketonuria

Table 3: Changes in relative specific gravity of urine

Term	Value of relative specific gravity	Causes
<i>Eusthenuria</i>	1.020 – 1.040	
<i>Hypersthenuria</i>	↑ 1.040	<ul style="list-style-type: none"> dehydration glucosuria proteinuria
<i>Hyposthenuria</i>	↓ 1.020	<ul style="list-style-type: none"> diabetes insipidus hyperhydration renal failure diuretic drugs
<i>Isosthenuria</i>	= 1.010	<ul style="list-style-type: none"> severe kidney damage

Table 5: Common factors affecting pH of urine

Acidic pH	Alkaline pH
protein-rich diet	vegetarian diet
dehydration	renal tubular acidosis
diabetic ketoacidosis	respiratory and metabolic alkalosis
metabolic and respiratory acidosis	bacterial infections of urinary tract
starvation	