Sample Collected on : 10-Aug-2023 16:34
Sample Received on : 10-Aug-2023 16:34
Report Released on : 14-Aug-2023 13:09
Sample Type : Stone

Stone analysis report by FTIR (Fourier Transform Infrared Spectroscopy)

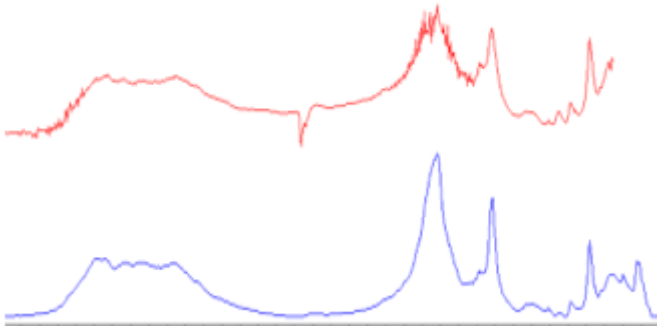
Kidney Stone analysis by Crystallographic FTIR Technology

Kidney stones (renal lithiasis, nephrolithiasis) are small, hard mineral deposits that form inside the kidneys. The stones are made of mineral and acid salts. Kidney stones have many causes and can affect any part of the urinary tract — from kidneys to bladder. Often, stones form when the urine becomes concentrated, allowing minerals to crystallize and stick together.

Physical and Chemical Crystallographic Examination:

Sample Type: Kidney Stone (M)
Weight: 0.72gms
Measurement: 1.0 X1.0cms
Color: outer surface shows Brown

Method: FTIR (**Fourier Transform Infrared Spectroscopy)**



Result: Stone Composition:

Component name	Approximate percentage present in stone
Calcium Oxalate	80%
Calcium Phosphate	10%
Uric acid	10%

General information

Composition of kidney stone varies from patient to patient based on the location where they are formed, food habits of individual and geographical location. As composition of urinary stones varies from place to place, qualitative analysis of crystals

material present in kidney stones is essential to provide ideal treatment to patients with history of recurrent stone formation.

Calcium oxalate — Calcium oxalate is the most common component found in kidney stones (approximately 70 to 80 percent). Calcium oxalate can be found in monohydrate (crystal name: whewellite) and dihydrate (crystal name: weddellite) forms
Calcium oxalate can also be present in combination with uric acid or calcium phosphate. Because calcium oxalate stones typically grow on a Randall's plaque (composed of calcium phosphate) on the papillary
Urinary risk factors for calcium oxalate crystal formation are lower urine volume, higher urine calcium excretion, higher urine oxalate excretion, and lower urine citrate excretion. Calcium oxalate crystals are pH insensitive in the physiologic pH range of 5 to 8

Calcium phosphate — Calcium phosphate is found in approximately 15 percent of kidney stones and can be present in combination with calcium oxalate or struvite. Because of differences in solubility due to urine pH, calcium phosphate is not found mixed with uric acid. The two forms of calcium phosphate include apatite (sometimes reported as carbonate apatite), which is the crystal type found in bone, or calcium hydrogen phosphate (brushite); the frequency of apatite is much greater than brushite.

Urinary risk factors for calcium phosphate crystal formation are lower urine volume, higher urine calcium excretion, lower urine citrate excretion, higher urinary pH, and likely higher urine phosphate excretion. In contrast to calcium oxalate crystals, calcium phosphate crystals are pH sensitive, forming in "alkaline" urine

Uric acid — Uric acid is the most common crystal form that contains urate. Rare crystals that contain urate include sodium urate (which is present in the joint fluid of patients with gouty arthritis) and ammonium urate. Uric acid is present in approximately 8 percent of analyzed stones, sometimes in combination with calcium oxalate.

The urinary risk factors for uric acid crystal formation are lower urine volume, higher urine uric acid excretion, and most importantly, lower urinary pH. Uric acid crystals are pH sensitive, only forming in "acidic" urine

Struvite — Struvite is the crystal name for stones that form only in the presence of urease-producing bacteria (eg, Proteus mirabilis) in the upper urinary tract. Other names for this crystal type include "triple phosphate and magnesium ammonium phosphate carbonate apatite.

Struvite is found in approximately 1 percent of analyzed stones and is much more common in women than in men (due to the higher risk of urinary tract infections in women). If a preexisting calcium-containing kidney stone is subsequently infected with a urease-producing bacterium, the stone analysis may report that the composition of the stone includes calcium oxalate or calcium phosphate in addition to struvite

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