Test Definition: COUO

Cobalt Occupational Exposure, Random, Urine

Overview

Useful For

Screening for occupational exposure to cobalt

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
CRETR	Creatinine, Random, U	No	Yes
COUOE	Cobalt Occupational Exposure, U	No	Yes

Special Instructions

- Metals Analysis Specimen Collection and Transport

Method Name

CRETR: Enzymatic Colorimetric Assay

COUOE: Triple-Quadrupole Inductively Coupled Plasma Mass Spectrometry (ICP-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

Urine

Specimen Required

Patient Preparation: High concentrations of gadolinium and iodine are known to potentially interfere with most inductively coupled plasma mass spectrometry-based metal tests. If either gadolinium- or iodine-containing contrast media has been administered, **a specimen should not be collected for 96 hours.**

Supplies: Urine Tubes, 10 mL (T068)

Collection Container/Tube: Clean, plastic urine collection container with no metal cap or glued insert

Submission Container/Tube: Plastic 10 mL urine tube or a clean, plastic aliquot container with no metal cap or glued insert

Specimen Volume: 3 mL

Collection Instructions:

1. At the end of the work week, collect a random urine specimen at the end of the employee's work shift.
2. See Metals Analysis Specimen Collection and Transport for complete instructions.

Specimen Minimum Volume

2 mL

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	28 days	
	Ambient	14 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Cobalt is rare but widely distributed in the environment. It is an essential cofactor in vitamin B12. While cobalt is an essential element, cobalt deficiency has not been reported in humans.

Cobalt is used in the manufacture of hard alloys with high melting points and resistance to oxidation. Cobalt salts are also used in the glass and pigment industry. Previously, cobalt salts were sometimes used as foam stabilizers in the brewing industry; this practice was banned due to the cardiovascular diseases it induced. The radioactive isotope of cobalt, (60)Co, is used as a gamma emitter in experimental biology, cancer therapy, and industrial radiography.

Cobalt is not highly toxic, but large doses will produce adverse clinical manifestations. Acute symptoms are pulmonary edema, allergy, nausea, vomiting, hemorrhage, and kidney failure. Chronic symptoms include pulmonary syndrome, skin disorders, and thyroid abnormalities. The inhalation of dust during machining of cobalt alloyed metals can lead to interstitial lung disease. Improperly handled (60)Co can cause radiation poisoning from exposure to gamma radiation.

Reference Values

COBALT:
0-17 years: Not established
> or =18 years: The American Conference of Governmental Industrial Hygienists Biological Exposure Index for cobalt in urine is an end-of-shift concentration above 14.9 mcg/L at the end of the work week.

CREATININE:
0-17 years: Not established
> or =18 years: 16-326 mg/dL

Interpretation

For occupational exposure, the sampling time is at the end of the shift at the end of the work week. The American Conference of Governmental Industrial Hygienists Biological Exposure Index for cobalt is a concentration of 15.0 mcg/L or above at the end of the work week.

Cautions

Normal specimens have extremely low levels of cobalt; elevated results could easily be a result of external contamination. Precautions must be taken to ensure the specimen is not contaminated. Metal-free urine collection procedures must be followed. Refrigeration is preferred over chemical methods of preservation.

Clinical Reference

1. Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists (ACGIH); 2010
2. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. Toxicology profile for cobalt. HHS; October 2024. Accessed March 18, 2025. Available at www.atsdr.cdc.gov/ToxProfiles/tp33.pdf
3. Lison D, De Boeck M, Verougstraete V, Kirsch-Volders M. Update on the genotoxicity and carcinogenicity of cobalt compounds. Occup Environ Med. 2001;58(10):619-625
4. Sodi R. Vitamins and trace elements. Rifai N, Chiu RWK, Young I, eds: Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 39
5. Crutsen JRW, Koper MC, Jelsma J, et al. Prosthetic hip-associated cobalt toxicity: a systematic review of case series and case reports. EFORT Open Rev. 2022;7(3):188-199
6. Leyssens L, Vinck B, Van Der Straeten C, Wuyts F, Maes L. Cobalt toxicity in humans-A review of the potential sources and systemic health effects. Toxicology. 2017;387:43-56. doi:10.1016/j.tox.2017.05.015

Performance

Method Description

The metal of interest is analyzed by triple-quadrupole inductively coupled plasma mass spectrometry.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday

Report Available

2 to 8 days

Specimen Retention Time

14 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

83018
82570

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
COUO	Cobalt Occupat Exp, Random, U	13468-4

Result ID	Test Result Name	Result LOINC® Value
CRETR	Creatinine, Random, U	2161-8
607763	Cobalt Occupational Exposure	13468-4
608389	Cobalt Concentration	5628-3