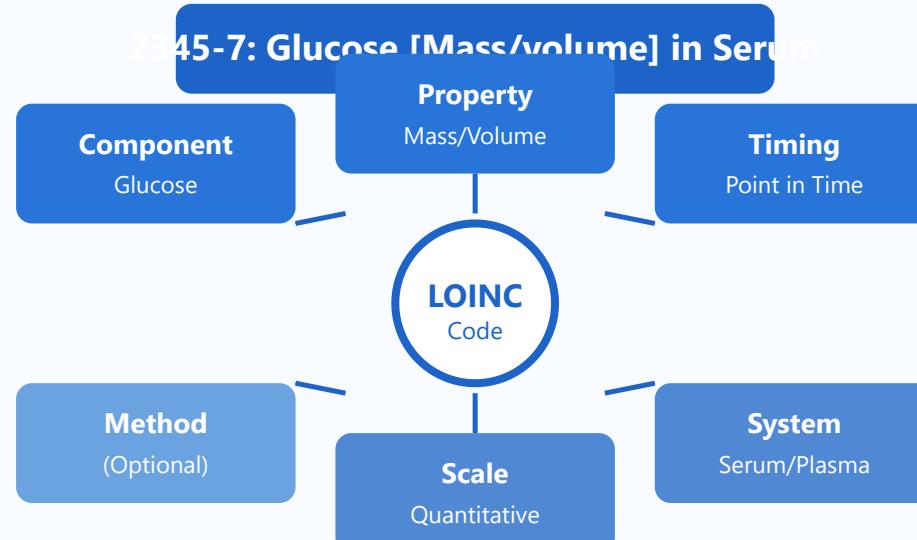


LOINC for Laboratory Tests

LOINC Six-Part Structure



Common LOINC Code Examples

2160-0

Creatinine in Serum

718-7

Hemoglobin in Blood

2951-2

Sodium in Serum

4544-3

Hematocrit in Blood



Test Categories

- Chemistry tests
- Hematology & coagulation
- Microbiology cultures
- Serology & immunology
- Molecular pathology



Panel Organization

- Basic Metabolic Panel (BMP)
- Complete Blood Count (CBC)
- Comprehensive Metabolic Panel
- Lipid panel
- Liver function tests



LOINC Properties

- MCnc: Mass concentration
- NCnc: Number concentration
- Prid: Presence/Identity



UCUM Units

- mg/dL, mmol/L (chemistry)
- 10³/uL (cell counts)
- IU/L (enzymes)

- Titr: Titer (dilution)
- Arb: Arbitrary units

- Standardized unit conversion
- Reference range mapping

Detailed Category Descriptions



Test Categories

LOINC provides comprehensive coverage of laboratory test categories, each representing different analytical domains in clinical diagnostics. These categories enable systematic organization and identification of all laboratory observations.

Laboratory Test Category Hierarchy

Chemistry Tests

- Glucose
- Electrolytes
- Creatinine
- BUN
- Liver enzymes
- Proteins
- Lipids

Example:
2345-7: Glucose

Hematology

- Complete Blood Count
- Hemoglobin
- WBC count
- Platelet count
- Coagulation tests
- PT/INR
- aPTT

Example:
718-7: Hemoglobin

Microbiology

- Bacterial cultures
- Sensitivity testing
- Viral cultures
- Fungal cultures
- Parasitology
- Identification
- Gram stain

Example:
600-7: Bacteria ID

Serology

- Antibody tests
- Antigen detection
- Immunoglobulins
- Tumor markers
- Hormones
- Autoantibodies
- Complement

Example:
16128-1: TSH

Real-World Example: Chemistry Test

Test: Glucose measurement in serum/plasma

LOINC Code: 2345-7

Full Name: Glucose [Mass/volume] in Serum or Plasma

Clinical Use: Diabetes screening, monitoring, diagnosis of hyperglycemia/hypoglycemia

Units: mg/dL or mmol/L (UCUM standard)

Real-World Example: Hematology Test

Test: Hemoglobin measurement in whole blood

LOINC Code: 718-7

Full Name: Hemoglobin [Mass/volume] in Blood

Clinical Use: Anemia diagnosis, blood loss assessment, monitoring chronic disease

Units: g/dL or g/L (UCUM standard)



Panel Organization

Laboratory test panels group related tests together for efficient clinical assessment. LOINC provides specific codes for both individual tests and complete panels, enabling comprehensive documentation of multi-test orders.

Common Laboratory Panels

Basic Metabolic Panel

(BMP - LOINC: 51990-0)

- Glucose
- Sodium
- Potassium
- Chloride
- CO₂, BUN, Creatinine

Complete Blood Count

(CBC - LOINC: 58410-2)

- WBC count
- RBC count
- Hemoglobin
- Hematocrit
- Platelet count, MCV

Comprehensive Metabolic Panel

(CMP - LOINC: 24323-8)

- All BMP tests
- Albumin
- Total protein
- AST, ALT, ALP
- Total bilirubin

Lipid Panel

(LOINC: 24331-1)

- Total cholesterol
- HDL cholesterol
- LDL cholesterol
- Triglycerides
- Chol/HDL ratio

Panel Structure in LOINC

Panel LOINC Code

51990-0 (BMP)

2345-7
Glucose

2951-2
Sodium

2160-0
Creatinine

Real-World Example: Basic Metabolic Panel (BMP)

Panel LOINC Code: 51990-0

Full Name: Basic metabolic panel - Blood

Components: 8 individual tests (Glucose, Sodium, Potassium, Chloride, CO₂, BUN, Creatinine, Calcium)

Clinical Use: Routine metabolic screening, kidney function assessment, electrolyte balance

Advantage: Single order code generates all component test orders

Real-World Example: Complete Blood Count (CBC)

Panel LOINC Code: 58410-2

Full Name: Complete blood count (hemogram) panel - Blood by Automated count

Components: WBC, RBC, Hemoglobin, Hematocrit, MCV, MCH, MCHC, Platelets, RDW

Clinical Use: Anemia diagnosis, infection screening, general health assessment

Result Format: Each component has its own LOINC code for reporting



LOINC Properties

The Property axis in LOINC defines what is being measured about the analyte. This critical component distinguishes different measurement types for the same substance, ensuring precise test identification.

LOINC Property Types

MCnc
Mass Concentration

Mass per unit volume
Most common property

Example Units:
mg/dL, g/L, mmol/L

Example Test:
Glucose: 2345-7

NCnc
Number Concentration

Count per unit volume
Used for cell counts

Example Units:
 $10^3/\mu\text{L}$, $10^6/\mu\text{L}$

Example Test:
WBC count: 6690-2

Prid
Presence/Identity

Qualitative detection
Present/absent results

Example Results:
Positive, Negative

Example Test:
Bacteria ID: 600-7

Titr
Titer (dilution)

Serial dilution testing
Antibody levels

Example Results:
1:8, 1:64, 1:256

Example Test:
ANA titer: 5048-9

Arb
Arbitrary Units

Non-standard units
Immunoassays

Example Units:
[arb'U]/mL, U

Example Test:
IgE: 19113-0

Additional Properties

- **ACnc:** Activity concentration (enzymes)
- **CCnc:** Catalytic concentration
- **MFr:** Mass fraction (percentage)
- **NFr:** Number fraction
- **Rto:** Ratio
- **Vol:** Volume
- **Time:** Measurement of time

Real-World Example: Mass Concentration (MCnc)

Test: Glucose in Serum

LOINC Code: 2345-7

Property: MCnc (Mass Concentration)

Measurement: Mass of glucose per volume of serum

Units: mg/dL (conventional) or mmol/L (SI units)

Calculation: If result is 100 mg/dL, this means 100 milligrams of glucose per deciliter of serum

Real-World Example: Number Concentration (NCnc)

Test: White Blood Cell Count

LOINC Code: 6690-2

Property: NCnc (Number Concentration)

Measurement: Number of WBCs per unit volume

Units: $10^3/\mu\text{L}$ (thousands per microliter) or $10^9/\text{L}$

Interpretation: Result of 7.5 means 7,500 white blood cells per microliter



UCUM Units (Unified Code for Units of Measure)

UCUM provides a standardized system for expressing units of measure in clinical laboratory testing. Integration with LOINC ensures consistent, unambiguous reporting of test results across different healthcare systems.

UCUM Unit Categories

Chemistry Units

Mass/Volume
mg/dL, g/L, ug/mL

Molar Concentration
mmol/L, umol/L

Percentage
%, g/dL (fraction)

Example: Glucose mg/dL

Hematology Units

Cell Counts
 $10^3/\mu\text{L}$, $10^6/\mu\text{L}$

Mass Concentration
g/dL, g/L

Volume Fraction
% (hematocrit)

Example: WBC $10^3/\mu\text{L}$

Enzyme Units

Activity
IU/L, U/L

Catalytic Concentration
kat/L, ukat/L

Temperature
Cel (37°C standard)

Example: ALT IU/L

Unit Conversion Example: Glucose

Conventional Units

100 mg/dL

(Mass per volume)

$\div 18.02$

SI Units

5.55 mmol/L

(Molar concentration)

Reference Ranges:

- Fasting: 70-100 mg/dL (3.9-5.6 mmol/L)
- Random: <140 mg/dL (7.8 mmol/L)

UCUM Representation:

- Conventional: mg/dL
- SI: mmol/L

Real-World Example: Chemistry Test Units

Test: Serum Creatinine

LOINC Code: 2160-0

Conventional Units: mg/dL (milligrams per deciliter)

SI Units: umol/L (micromoles per liter)

Conversion Factor: mg/dL \times 88.4 = umol/L

Example: 1.2 mg/dL = 106 umol/L

Reference Range: 0.7-1.3 mg/dL (62-115 umol/L) for males

Real-World Example: Hematology Cell Count Units

Test: White Blood Cell Count

LOINC Code: 6690-2

UCUM Units: 10³/uL (thousands per microliter)

Alternative: 10⁹/L (billions per liter)

Conversion: 1 \times 10³/uL = 1 \times 10⁹/L

Example Result: 7.5 \times 10³/uL means 7,500 cells per microliter

Reference Range: 4.5-11.0 \times 10³/uL

Real-World Example: Enzyme Activity Units

Test: Alanine Aminotransferase (ALT)

LOINC Code: 1742-6

UCUM Units: IU/L or U/L (International Units per liter)

SI Alternative: ukat/L (microkatal per liter)

Conversion: 1 U/L = 0.0167 ukat/L

Temperature: Measured at 37°C (body temperature)

Reference Range: 7-56 U/L (varies by laboratory)

LOINC® is maintained by the Regenstrief Institute and is freely available for use.

For complete LOINC database and documentation, visit loinc.org