

INTERNATIONAL UNION OF PURE
AND APPLIED CHEMISTRY

CHEMISTRY AND HUMAN HEALTH DIVISION
CLINICAL CHEMISTRY SECTION
COMMISSION ON NOMENCLATURE, PROPERTIES AND UNITS (C-NPU)*
(Technical report 1997)

AND

INTERNATIONAL FEDERATION OF CLINICAL CHEMISTRY
SCIENTIFIC DIVISION
COMMITTEE OF NOMENCLATURE, PROPERTIES AND UNITS (C-NPU)*
(Recommendation 1997)

**PROPERTIES AND UNITS IN THE CLINICAL
LABORATORY SCIENCES:
Part IV. Properties and their code values**

(Technical Report)
(IUPAC—IFCC 1997)

Prepared for publication by

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Properties and units in the clinical laboratory sciences: Part IV. Properties and their code values (Technical Report)

Synopsis

To facilitate and to assure correct electronic transmission of request and report on clinical laboratory properties over cultural and linguistic barriers, a systematic nomenclature has been prepared for a series of laboratory specialities.

Each defined property has been given a unique code value preceded by the coding scheme identifier: NPU.

The NPU code value and its adhering code value string for each term allow expression of the concept according to local script, idiom or conventions.

The coding scheme is accessible on Internet from C-NPU Home page address http://inet.uni-c.dk/home/ifcc_iupac_cnpu.

Scope

The coding scheme prepared is intended as a repository of code values and terms of properties to be used in the transfer of information on such properties through computing and telecommunication equipment used in the health services.

Preface

The document is the fourth part of a series on properties measured in the clinical laboratory sciences initiated in 1987.

The series will comprise the five general parts (I-IV and XI) and a series of special parts:

- I Syntax and semantic rules [1]
- II Kinds-of-property [2]
- III Elements (of properties) and their code values
- IV Properties and their code values
- V Properties and units in Thrombosis and Haemostasis [3]
- VI Properties and units in IOC prohibited Drugs [4]
- VII Properties and units in Inborn Errors of Metabolism
- VIII Properties and units in Clinical Bacteriology
- IX Properties and units in Trace elements
- X Properties and units in General Clinical Chemistry
- XI Coding systems - Structure and guidelines
- XII Properties and units in Clinical Pharmacology and Toxicology
- XIII Properties and units in Reproduction and Fertility
- XV WWW databases
- XVI Properties and units in Clinical Allergology

The size and complexity of part III and IV is such that their lists will be presented in electronic format only.

The overall aim is access by electronic media of:

"Compendium of terminology and nomenclature of properties in clinical laboratory sciences" [5].

"Glossary of terms in quantities and units in clinical chemistry" [6].

"Properties and units in the clinical laboratory sciences" (the present series of documents).

INTRODUCTION

The variety of properties observed in the domain of the Clinical Laboratory Sciences is well over 5000. The number of properties observed is 5 to 10 per inhabitant per year in industrialised countries.

An increasing part of the billions of requests and reports is transmitted by electronic means, mostly by code values from a local coding scheme.

The expression of the meaning of a code value is according to local habit, rules and conventions. This often is not readily transformed to coded sets from other coding schemes.

To facilitate inter region electronic communication, the European standard ENV 1614:1995 [7] has presented a system of concepts based on [8] for a systematic nomenclature to function as a bridge between local dialects.

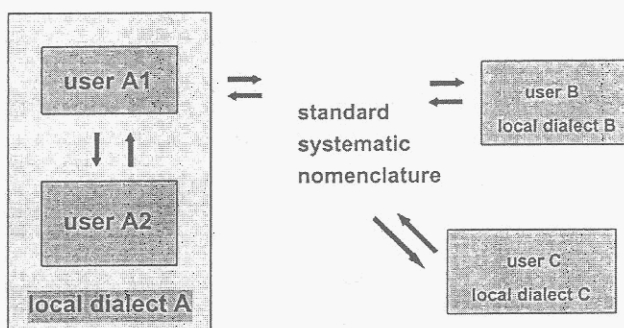


Fig. 1. From ENV 1614:1995 [7]

Based on this system of concepts and on the European standard ENV 12435:1996 [9], that deals with the presentation of results, terms have been elaborated and codified for communication between clinical laboratory information systems and other health information systems.

A basic document for further description and clarification is "Compendium of terminology and nomenclature of properties in the clinical laboratory sciences" [5], while details of the syntax and semantic rules are given in [1].

SYSTEMATIC NAMES AND RESULTS

The outcome of a laboratory examination may be schematised as

Property = Result

or more specified

System(specification)–; kind-of-property(specification) = value · unit

or as generally in Clinical Laboratory Sciences

System(specification)—Component(specification); kind-of-property(specification) = value · unit

Although the system of concepts is generally applicable, modifications and extensions are needed in some subject fields.

For this reason, detailed coding schemes for some categories of properties have been worked out by authorities in that speciality for publication in separate documents. The present document is a compilation of terms from the different specialities.

Each term has been given a code value prefixed by the coding scheme identifier NPU (from Nomenclature, Properties and Units). The numeric value is a consecutive number with no meaning per se. It represents a code value string for that property; that is a series of values representing semantic links and a series representing values for elements from the coding scheme in part III (Elements (of properties) and their code values) (Table 1).

Table 1.			
Semantic link		Element (example)	
Code value	Meaning	Code value	Meaning
	Now follows a code value of a:		
QU59901	System	MSH94D010949	Plasma
QU59902	Specification to a system		
QU59903	Component	CAS50-99-7	Glucose
QU59904	Specification to a component		
QU59905	Kind-of-property	QU50003	substance concentration
QU59906	Specification to a property		
QU59907	Numerical value	=	5,6
QU59909	Unit	QU09408	millimole/litre
QU59910	End code	QU99999	End

or as a code value string:

[NPU02192] Δ QU59901:MSH94D010949:QU59903:CAS50-99-7:QU59905:QU50003:QU59907: = 5,6:QU59909:QU09408:QU59910:QU99999:

The coding scheme for properties basically comprises a list of coded sets that is an NPXXXXXX and a corresponding code value string (Sample page 1). On expressing the code values for elements in a particular language, the list of properties is generated in that language. The present list is presented in English (Sample pages 2 and 3).

Details are in part XI Coding systems - Structure and guidelines.

Each entry comprises a term with an NPU code value and when appropriate a molar mass, calibrator, authority, (when appropriate other terms and notes), and an example in a short form.

EXAMPLE

Plasma—
Glucose;
substance concentration
millimole/litre
M = 180,2 g/mol
 Authority: CAS50-99-7
 [NPU02192]
 P—Glucose; subst.c. = ? mmol/l

FUNCTIONALITY

Specialities

Testing and inclusion in the list has been done for clinical allergology, clinical bacteriology, clinical chemistry, clinical pharmacology, complement factors, haematology, clinical immunology, inborn errors of metabolism, reproduction and fertility, trace elements, and thrombosis and haemostasis.

The list is to be expanded as needs arise.

Linguistic expression

The basis of the coding scheme is the code value strings, representing the meaning of the NPU code values.

The expression has been successfully tested in:

1. Germanic languages: English, German, Dutch, Norwegian, Swedish, Danish.
2. Romance languages: French, Catalan, Italian, Spanish, Portuguese.
3. Slavic languages: Czech, Slovak.
4. Other languages: Arabic, Chinese, Finnish and Welsh.

EXAMPLE [NPU02192]

P—Glukos; subst konc = 5,6 mmol/L Swedish
Pla—Glucosa; c.sust. = 5,6 mmol/l Spanish

Internet access

The information on properties is given in three forms on the Home page:

1. Code value strings preceded by an NPU code value as in Sample page 1. Each code value string represents the definition of a property (See sample pages 2 and 4).
2. Short form comprising the abbreviated presentation of properties as in Sample page 4.
3. Complete text as in Sample pages 2 and 3.

REFERENCES

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- [9] CEN/TC 251, 1996. European Standard ENV 12435. Medical informatics. Expression of the results of measurement in health sciences.

SAMPLE PAGE 1 (code value strings)

NPU1001	QU59901:MSH94D014556:QU59903:CAS37517-30-9:QU59905:QU50081:QU59906:QU50601:QU59907: = ? :QU59910:QU99999
NPU1002	QU59901:MSH94D014556:QU59903:CAS37517-30-9:QU59905:QU50081:QU59906:QU50603:QU59907: = ? :QU59910:QU99999
NPU1003	QU59901:MSH94D014556:QU59903:CAS37517-30-9:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1004	QU59901:MSH94D010949:QU59903:CAS61-00-7:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1005	QU59901:MSH94D01769:QU59903:CAS75-07-0:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1006	QU59901:MSH94D014556:QU59903:CAS75-07-0:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1007	QU59901:MSH94D014556:QU59903:CAS59-66-5:QU59905:QU50081:QU59906:QU50601:QU59907: = ? :QU59910:QU99999
NPU1008	QU59901:MSH94D014556:QU59903:CAS59-66-5:QU59905:QU50081:QU59906:QU50603:QU59907: = ? :QU59910:QU99999
NPU1009	QU59901:MSH94D014556:QU59903:CAS59-66-5:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1010	QU59901:MSH94D002555:QU59903:MSH94D000090:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1011	QU59901:MSH94D010949:QU59903:MSH94D000090:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999
NPU1012	QU59901:MSH94D014556:QU59903:MSH94D000090:QU59905:QU50003:QU59906:QU70500:QU59907: = ? :QU59909:QU09408:QU59910:QU99999
NPU1013	QU59901:MSH94D010949:QU59903:QU60505:QU59905:QU50032:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10417:QU59910:QU99999
NPU1014	QU59901:MSH94D000653:QU59903:EC2.3.1.9:QU59905:QU50032:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10417:QU59910:QU99999
NPU1015	QU59901:QU65001:QU59903:EC2.3.1.9:QU59905:QU50033:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10416:QU59910:QU99999
NPU1016	QU59901:QU65003:QU59903:EC2.3.1.9:QU59905:QU50033:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10416:QU59910:QU99999
NPU1017	QU59901:QU65004:QU59903:EC2.3.1.9:QU59905:QU50033:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10416:QU59910:QU99999
NPU1018	QU59901:QU65011:QU59903:EC2.3.1.9:QU59905:QU50033:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10416:QU59910:QU99999
NPU1019	QU59901:MSH94D010949:QU59903:EC2.3.1.9:QU59905:QU50032:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10417:QU59910:QU99999
NPU1020	QU59901:QU65021:QU59903:EC2.3.1.9:QU59905:QU50033:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10416:QU59910:QU99999
NPU1021	QU59901:QU65023:QU59903:EC2.3.1.9:QU59905:QU50033:QU59906:QU70724:QU59906:QU70500:QU59907: = ? :QU59909:QU10416:QU59910:QU99999
NPU1022	QU59901:MSH94D014556:QU59903:QU60438:QU59905:QU50003:QU59907: = ? :QU59909:QU10408:QU59910:QU99999

SAMPLE PAGE 2 (full text, according to sample page 1; NPU01001 to NPU01016)

- Urine—**
Acebutolol(IOC 95 Screen; 0 1)
M = 336,43 g/mol
 Authority: IOC; IFCC/C-LDA; INN88; CAS37517-30-9
 [NPU01001]
 U—Acebutolol(IOC 95 Screen; 0 1) = ?
- Urine—**
Acebutolol;
 arbitrary concentration(IOC 95 Confirm; 0 1)
M = 336,43 g/mol
 Authority: IOC; IFCC/C-LDA; INN88; CAS37517-30-9
 [NPU01002]
 U—Acebutolol; arb.c.(IOC 95 Confirm; 0 1) = ?
- Urine—**
Acebutolol;
 substance concentration
 micromole/litre
M = 336,43 g/mol
 Authority: INN88; CAS37517-30-9
 [NPU01003]
 U—Acebutolol; subst.c. = ? µmol/l
- Plasma—**
Acepromazine;
 substance concentration
 micromole/litre
M = 326,47 g/mol
 Authority: INN88; CAS61-00-7
 [NPU01004]
 P—Acepromazine; subst.c. = ? µmol/l
- Blood—**
Acetaldehyde;
 substance concentration
 micromole/litre
M = 44,05 g/mol
 Authority: CAS75-07-0
 [NPU01005]
 B—Acetaldehyde; subst.c. = ? µmol/l
- Urine—**
Acetaldehyde;
 substance concentration
 micromole/litre
M = 44,05 g/mol
 Authority: CAS75-07-0
 [NPU01006]
 U—Acetaldehyde; subst.c. = ? µmol/l
- Urine—**
Acetazolamide;
 arbitrary concentration(IOC 95 Screen; 0 1)
M = 222,25 g/mol
 Authority: IOC; IFCC/C-LDA; INN88; CAS59-66-5
 [NPU01007]
 U—Acetazolamide; arb.c.(IOC 95 Screen; 0 1) = ?
- Urine—**
Acetazolamide;
 arbitrary concentration(IOC 95 Confirm; 0 1)
M = 222,25 g/mol
 Authority: IOC; IFCC/C-LDA; INN88; CAS59-66-5
 [NPU01008]
 U—Acetazolamide; arb.c.(IOC 95 Confirm; 0 1) = ?
- Urine—**
Acetazolamide;
 substance concentration
 micromole/litre
M = 222,25 g/mol
 Authority: INN88; CAS59-66-5
 [NPU01009]
 U—Acetazolamide; subst.c. = ? µmol/l
- Cerebrospinal fluid—**
Acetoacetate;
 substance concentration
 micromole/litre
 Authority: MSH94D000090
 [NPU01010]
 Csf—Acetoacetate; subst.c. = ? µmol/l
- Plasma—**
Acetoacetate;
 substance concentration
 millimole/litre
 Authority: MSH94D000090
 [NPU01011]
 P—Acetoacetate; subst.c. = ? mmol/l
- Urine—**
Acetoacetate;
 substance concentration(procedure)
 millimole/litre
 Authority: MSH94D000090
 [NPU01012]
 U—Acetoacetate; subst.c.(proc.) = ? mmol/l
- Plasma—**
Alkaline phosphatase, liver type;
 catalytic-activity concentration(37 °C; procedure)
 mikrokatal/litre
 [NPU01013]
 P—Alkaline phosphatase, liver type; cat.c.(37 °C; proc.) = ? µkat/l
- Amniotic fluid—**
Acetyl-CoA acetyltransferase;
 catalytic-activity concentration(37 °C; procedure)
 mikrokatal/litre
 Authority: EC2.3.1.9
 [NPU01014]
 Amf—Acetyl-CoA acetyltransferase; cat.c.(37 °C; proc.) = ? µkat/l
- Amniotic fluid cells(cultured) protein—**
Acetyl-CoA acetyltransferase;
 catalytic-activity content(37 °C; procedure)
 mikrokatal/kilogram
 Authority: EC2.3.1.9
 [NPU01015]
 Amf cells(cult.) prot.—Acetyl-CoA acetyltransferase;
 cat.cont.(37 °C; proc.) = ? µkat/kg
- Chorionic villus cell protein—**
Acetyl-CoA acetyltransferase;
 catalytic-activity content(37 °C; procedure)
 mikrokatal/kilogram
 Authority: EC2.3.1.9
 [NPU01016]
 Chor.villus cell prot.—Acetyl-CoA acetyltransferase;
 cat.cont.(37 °C; proc.) = ? µkat/kg

SAMPLE PAGE 3 (selected random full text examples)

- Amniotic fluid—**
Acetylcholinesterase;
catalytic-activity concentration(37 °C; procedure)
microkatal/litre
 Other term(s): AChE; Cholinesterase; Choline esterase I; True cholinesterase
 Authority: EC3.1.1.7
 [NPU01034]
 Amf—Acetylcholinesterase; cat.c.(37 °C; proc.) = ? μ kat/l
- Chorionic villus cell protein—**
N-
Acetylgalactosamine-4-sulfatase;
catalytic-activity content(37 °C; procedure)
microkatal/kilogram
 Other term(s): Arylsulfatase B; Chondroitinase; Chondroitinsulfatase; Chondrosulfatase
 Authority: EC3.1.6.12
 [NPU01039]
 Chor.villus cell prot.—N-Acetylgalactosamine-4-sulfatase; cat.cont.(37 °C; proc.) = ? μ kat/kg
- Patient(Urine)—**
Adrenalinium+noradrenalinium excretion;
substance rate(procedure)
micromole/day
 Other term(s): Catecholamines; Levarterenol
 [NPU01105]
 Pt(U)—Adrenalinium+noradrenalinium excretion; subst.rate(proc.) = ? μ mol/d
- Urine—**
Adrenergic beta-Antagonist;
arbitrary concentration(list; procedure)
 Other term(s): Beta-Antagonist, adrenergic; Beta-Adrenergic receptor blockader; Beta-Adrenergic blocking agent; Beta-blocker, adrenergic; Beta-blocking drug
 Authority: MSH95D000319
 [NPU04413]
 U—Adrenergic beta-Antagonist; arb.c.(list; proc.) [NPU04576] U—Acebutolol; arb.c.(proc.) = ? [NPU04577] U—Alprenolol; arb.c.(proc.) = ? [NPU04579] U—Atenolol; arb.c.(proc.) = ?
- Hair—**
Arsenic;
substance content
micromole/kilogram
 A = 74,92
 Authority: IUPAC/VII/C-TOX; CAS7440-38-2
 [NPU01307]
 Hair—Arsenic; subst.cont. = ? μ mol/kg
- Plasma—**
***Borrelia burgdorferi* antibody(Immunoglobulin M);**
arbitrary substance concentration(procedure)
arbitrary unit/litre
 [NPU08018]
 P—*Borrelia burgdorferi* antibody(IgM); arb.subst.c.(proc.) = ? arb.unit/l
- Plasma(venous Blood)—**
Carbon dioxide(total);
substance concentration
millimole/litre
 M = 44,01 g/mol
 Authority: IFCC/C-BGE; CAS124-38-9
 [NPU01472]
 P(vB)—Carbon dioxide(tot.); subst.c. = ? mmol/l
- Plasma—**
Coagulation factor XIII;
relative substance concentration(immunological; actual/norm; procedure)
 M = 320 000 g/mol
 Other term(s): Fibrin stabilizing factor; Fibrinolygase; Fibrinase Laki-Lorand factor; Plasma transglutaminase; Plasma transamidase; Protransglutaminase
 Authority: Isth/SSC93; CAS9013-56-3
 [NPU01673]
 P—Coagulation factor XIII; rel.subst.c.(imm.; actual/norm; proc.) = ?
- System—**
Streptokinase;
arbitrary substance concentration(IS 62/7; procedure)
international unit/litre
 M = 47 408 g/mol
 Calibrator: WHO 1st IS 62/7
 Other term(s): SK; STK
 Authority: CAS9002-01-1
 [NPU04024]
 Syst.—Streptokinase; arb.subst.c.(IS 62/7; proc.) = ? int. unit/l

SAMPLE PAGE 4 (short form - abbreviated presentation - according to sample pages 1 and 2)

NPU	Property
01001	U—Acebutolol; arb.c.(IOC 95 Screen; 0 1) = ?
01002	U—Acebutolol; arb.c.(IOC 95 Confirm; 0 1) = ?
01003	U—Acebutolol; subst.c. = ? $\mu\text{mol/l}$
01004	P—Acepromazine; subst.c. = ? $\mu\text{mol/l}$
01005	B—Acetaldehyde; subst.c. = ? $\mu\text{mol/l}$
01006	U—Acetaldehyde; subst.c. = ? $\mu\text{mol/l}$
01007	U—Acetazolamide; arb.c.(IOC 95 Screen; 0 1) = ?
01008	U—Acetazolamide; arb.c.(IOC 95 Confirm; 0 1) = ?
01009	U—Acetazolamide; subst.c. = ? $\mu\text{mol/l}$
01010	Csf—Acetoacetate; subst.c. = ? $\mu\text{mol/l}$
01011	P—Acetoacetate; subst.c. = ? mmol/l
01012	U—Acetoacetate; subst.c.(proc.) = ? mmol/l
01013	P—Alkaline phosphatase, liver type; cat.c.(37 °C; proc.) = ? $\mu\text{kat/l}$
01014	Amf—Acetyl-CoA acetyltransferase; cat.c.(37 °C; proc.) = ? $\mu\text{kat/l}$
01015	Amf cells(cult.) prot.—Acetyl-CoA acetyltransferase; cat.cont.(37 °C; proc.) = ? $\mu\text{kat/kg}$
01016	Chor.villus cell prot.—Acetyl-CoA acetyltransferase; cat.cont.(37 °C; proc.) = ? $\mu\text{kat/kg}$
01017	Chor.villus cell(cult.) prot.—Acetyl-CoA acetyltransferase; cat.cont.(37 °C; proc.) = ? $\mu\text{kat/kg}$
01018	Lkc prot.—Acetyl-CoA acetyltransferase; cat.cont.(37 °C; proc.) = ? $\mu\text{kat/kg}$
01019	P—Acetyl-CoA acetyltransferase; cat.c.(37 °C; proc.) = ? $\mu\text{kat/l}$
01020	Skin fibrobl. Prot.—Acetyl-CoA acetyltransferase; cat.cont.(37 °C; proc.) = ? $\mu\text{kat/kg}$
01021	Skin fibrobl.(cult.) prot.—Acetyl-CoA acetyltransferase; cat.cont.(37 °C; proc.) = ? $\mu\text{kat/kg}$
01022	U—N-Acetyl-L-cystathionine; subst.c. = ? $\mu\text{mol/l}$