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Properties and units in the clinical laboratory sciences. Part XXIII. The NPU terminology, principles, and implementation: A user's guide (IUPAC Technical Report)*

Ulla Magdal Petersen[1,‡], René Dybkær[2], and Henrik Olesen[3]

[1]Health Documentation, National Board of Health, Copenhagen, Denmark; [2]Department of Standardization in Laboratory Medicine, Region H Frederiksberg Hospital, Frederiksberg, Denmark; [3]Copenhagen, Denmark

Abstract: This document describes the application of the syntax, semantic rules, and format of the Nomenclature for Properties and Units (NPU) terminology for coded dedicated kinds-of-property in the various subject fields of the clinical laboratory sciences. The document sums up considerations and reasoning by the Committee and Subcommittee on Nomenclature for Properties and Units (C-SC-NPU) and collects the experience with the system through some eight years of application in electronic health communication.

Access to the NPU terminology in English is currently at <www.labterm.dk>, via the English download files from the Danish Release Centre under the National Board of Health. Updates to the terminology are usually presented once a month.

Keywords: clinical laboratory; coding scheme; dedicated kind-of-property; electronic transmission; examination; IUPAC Chemistry and Human Health Division; measurement unit; NPU entry; property; semantic rule; syntax.

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‡Corresponding author

PREFACE

The present document is Part XXIII of a series on properties and units in the clinical laboratory sciences initiated in 1987.

The series currently comprises:

I.	Syntax and semantic rules [1]
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1. INTRODUCTION

The variety of *examinations** from clinical laboratories has increased over the last 50 years from a mere few hundred types to well over 30 000. The number of examinations performed per inhabitant in the western world is estimated now to be between 10 and 15 per year. The demand has risen due to

*The first time a concept defined in the *Vocabulary* appears in the text, it is given in italics.

improved reliability and increased variety of examinations, with improved significance for diagnosis, treatment, monitoring of treatment, and screening of patients.

During processing of an examination from ordering the examination to presentation of the outcome to the clinician, an identification of the examination may be needed some 5 times. Thus, per million inhabitants per year, keeping track of 10 to 15 million identifications is a huge task.

There are around 5000 different languages worldwide. Some 2000 of these have a written language. Within a language, each local health area has its own ways of expressing laboratory examination results. In addition, each specialty in the domain of the clinical laboratory sciences has its own *terminology*, *concepts*, *syntax*, formats for presentation, etc.

Crossing these communication barriers in a globalized world would be highly facilitated by a harmonized *coding scheme* with common semantic and syntactic rules independent of the language used.

From 1987, the Committee and Subcommittee on Nomenclature for Properties and Units (C-SC-NPU) of the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) and the International Union of Pure and Applied Chemistry (IUPAC) have produced a coding scheme for the domain of clinical laboratory examinations having the *International Coding Scheme Identifier* (ICSI) [17] "NPU". The associated syntax and the ensuing terminology are in concordance with international standards and rules for metrology.

The present document is a description of the principles and the structures for the *definition*s of the NPU terminology in the various subject fields of the clinical laboratory domain. Also, it sums up considerations and reasoning by the C-SC-NPU and collects the experience with the terminology through eight years of application.

2. SCOPE

The scope is to ascertain and document knowledge of the NPU system structure and of *procedure*s for maintenance of and updating the content of the NPU terminology, thus providing a guide for the user.

Access to the NPU terminology in English is currently at <www.labterm.dk>, a part of the download files from the Danish Release Centre under the National Board of Health. Updates with new NPU entries, corrections, and comments are usually presented once a month.

3. BACKGROUND AND HISTORY

The NPU terminology has evolved from 1966 [18] as projects by C-SC-NPU (originally IFCC/EPQU, later IUPAC/C-QUCC and IFCC/C-QU, from 1995 C-SC-NPU) under the aegis of IFCC and IUPAC.

The form and content of the NPU terminology is based on international recommendations and standards from the Bureau International des Poids et Mesures (BIPM) [19], the International Electrotechnical Commission (IEC) [17], the International Organization for Standardization (ISO) [20–22], the European Committee for Standardisation (CEN) [23,24], international terminologies related to the subject fields of clinical laboratories (see Section 9), and a series of Recommendations and Technical Reports from IFCC and IUPAC published since 1966 [1–16,25–32]. Specifically, the unwieldy term "amount-of-substance concentration" is abbreviated to "substance concentration" (rather than "amount concentration") in keeping with the documentation in the clinical laboratory sciences since 1966 [18] and the agreement with IUPAC physical chemists in Madrid 1975.

The work of describing and harmonizing terminologies of the various subject fields, and maintaining and adding entries is done in a continuous process according to the advice of the C-SC-NPU supported by both IFCC and IUPAC.

New subject fields in the domain of clinical laboratories (e.g., cluster of differentiation for leukocytes, CD) are dealt with as projects in cooperation with the proper international organization of each field. Such projects may be suggested to the C-SC-NPU.

4. THE CONCEPT MODEL

In the language of the natural sciences, the process 'examination' provides information on a *property* of an *object* studied.

The NPU concept model and the terminology are concerned with the properties of an actual patient, preferably without regard to the technology or procedure used to obtain the information. This ensures the stability of the terminology during technological development.

The concept model provides a systematic and standardised format for data produced by the clinical laboratories and assures correctness by use of either the formal description or the code. The outcome of an examination includes information concerning the property estimated and the examined property value, including *measurement unit* if relevant. No information is given on the correctness of the value.

A *dedicated kind-of-property* is described by three essential elements in the NPU terminology.

- **System:** part or phenomenon of the perceivable or conceivable world consisting of a demarcated arrangement of a set of elements and a set of relationships or processes between these elements

  NOTE: The system examined is implicitly assumed to be part of the comprehensive system: the patient subject to study including proximate environment.

- **Component:** part of a system

  NOTE: A component is the part of particular interest.

- **kind-of-property:** common defining aspect of mutually comparable properties

Specifications may be added to each of the three essential characteristics if there is a need for further information to pinpoint the meaning of the concept.

In the syntax of the NPU terminology a dedicated kind-of-property may be designated as, e.g.:

Plasma(venous Blood; fasting Patient)—
Glucose;
substance concentration
= ?
millimole per litre

Or in abbreviated format, prefixed by the NPU code:

NPU02195 P(vB; fPt)—Glucose; subst.c. = ? mmol/l

Italicized script and raised or lowered script may not be used in the abbreviated format, because this format is intended for use in electronic systems with limited character sets and formatting capacity. Therefore, the usual IUPAC style for abbreviated compound units (e.g., $mmol \cdot l^{-1}$) cannot be used, and the center dot and negative exponent are replaced with a slash (e.g., mmol/l).

4.1 System

The system is always a patient as such, a distinct part of the patient, or a part of the patient's surroundings, e.g., house dust or drinking water. Specifications added to the system may pinpoint or restrict the concept intended.

Specifications to a system usually designate one or more general superordinate systems of which the system is a part. They are used only if the information is of clinical significance.

EXAMPLES
Leukocytes(Marrow)—,
Secretion(Trachea)—,
Plasma(Foetus; capillary Blood)—

Information on the preparation of the patient or medication in connection with the examination is usually not included in the NPU entry definition; this should be part of the examination procedure, the laboratory manual, or the medical record. But if the examination is performed under conditions having a special clinical significance, then a particular state of the superordinate system is added.

EXAMPLE
Plasma(fasting Patient)—

The *term* "specification" in the system description indicates that, in addition to the definition in the NPU entry, some further information is needed for the system to be fully defined. This information has to be supplied by means other than the NPU definition.

EXAMPLES

Secretion(Middle ear; specification)—	(e.g., from left (Middle ear))
Calculus(specification)—	(e.g., from gall bladder or right kidney)
System(specification)—	(e.g., secretion from ulcer on right tibia)

where the information in the parentheses to the right has to be specified separately in messages and medical records.

Information on the sampling technique is not part of the system description. For that reason the NPU terminology does not include the term "serum" as a system definition, because this material does not occur in a patient; serum is an artifact created when coagulation of the collected sample is prescribed.

4.2 Component

The component may be a physical part of the system (a fluid, microorganisms, particles), a chemical or biochemical compound (an inorganic ion, an antibody, an enzyme), or a process (coagulation, secretion, sedimentation). When needed for clarification, a specification may be added.

EXAMPLES
Haemoglobin(Fe)
Apricot antibody(IgE)
Streptococcus pneumoniae(ag)
Streptococcus pneumoniae(DNA)

The (Fe) informs on the chosen part of the molecule, i.e., a protein chain with one iron atom, not a tetramer quaternary structure with four iron atoms. The (IgE) indicates a type of antibody, and (ag) or (DNA) indicate chemical entities of the bacteria in the examination by an immunological or a molecular biology procedure.

Some components are defined by their effect rather than by their chemical structure, for instance, coagulation factors, complement factors, and other enzymes. The simplest way to characterize and distinguish such components is often by the examination procedure, or a significant aspect of it.

EXAMPLES
NPU01276 P—Antithrombin; subst.c.(enz.; proc.) = ? µmol/l
NPU01277 P—Antithrombin; subst.c.(imm.; proc.) = ? µmol/l

An enzymatic and an immunologic measurement procedure relate respectively to an enzymatically active component and a component having a specific antigenic site.

In vitro procedures such as 'electrophoresis' or 'Coombs test' cannot as a rule occur as components. Instead, the components aimed at by these procedures are identified in the NPU definitions, e.g., 'protein type' and 'complement+immunoglobulin', respectively.

The spelling and orthography of chemical substances follow the rules of IUPAC. Components with a prefix, such as 'alpha-' or '17-', are dealt with as if the prefix were a separate element, in order to facilitate alphabetic sorting according to the trunk of the term. Organic acids, assumed to be partly dissociated in solutions, are given a suffix indicating the anion, e.g., malonate, not malonic acid. Similarly, organic bases are given a suffix indicating a cation, e.g., creatininium, not creatinine. The same applies to inorganic substances. Terms for amino acids being ampholytes are exempted from this rule.

4.3 Kind-of-property

A kind-of-property is an aspect common to mutually comparable properties. Many kinds-of-property are well known from daily life – 'number', 'colour', 'duration' – while others are specific for the laboratory domain: 'catalytic ratio' or 'sequence variation'.

The generic concept 'kind-of-property' comprises 'nominal kind-of-property' – such as 'colour' and 'sequence variation' – and 'kind-of-quantity' having the characteristic 'magnitude'. 'Kind-of-quantity' comprises 'ordinal', 'differential', and 'rational kinds-of-quantity'.

'Kind-of-quantity' may also be divided in 'base kind-of-quantity' of which there are seven in the International System of Quantities [33], and 'derived kind-of-quantity' with numerous individuals [22,25,27].

The latter concept may be divided in two:

- 'compositional kind-of-quantity' derived from two extensive kinds-of-quantity applied respectively to numerator component and denominator system of a defining fraction such as
  - substance concentration equal to amount-of-substance of component divided by volume of system

    EXAMPLE
    NPU03429 P—Sodium ion; subst.c. = ? mmol/l

  - mass concentration equal to mass of component divided by volume of system

    EXAMPLE
    NPU27551 U—Benzodiazepine; mass c. = ? µg/l

  - mass fraction equal to mass of component divided by mass of system

    EXAMPLE
    NPU04945 Prot.(U)—Alpha-1-globulin; mass fr. = ?

  - substance content equal to amount-of-substance of component divided by mass of system

    EXAMPLE
    NPU27273 F—Uroporphyrins; subst.cont. = ? µmol/kg

- 'material kind-of-quantity' derived as a defining fraction from two extensive kinds-of-quantity both applied to either component or system, such as
  - entitic volume equal to volume of component divided by number of entities in the component

EXAMPLE
NPU01944 B—Erythrocytes; entitic vol. = ? fl

- molar mass equal to mass of component divided by amount-of-substance of component
- volumic mass (mass density) equal to mass of system divided by volume of system

4.4 Property-value set and quantity-value scale

The different kinds-of-property use various formats for expression of property values [29,34–36]. In the case of nominal properties, the possible values are elements in a set that has no relation to magnitude. For quantities, the possible values are usually ordered in a scale according to magnitude.

Nominal value set. The value classifies, e.g., microorganisms or chemical compounds.

NPU06102 F—Salmonella+Shigella; taxon(proc.) = *Salmonella typhimurium*
NPU08931 U—Neuroleptic drug; taxon(proc.) = chlorpromazine; flupentixol

Ordinal scale. The possible values constitute a set arranged according to magnitude; differences or ratios cannot be compared meaningfully.

NPU22248 Trcs(B)—Aggregation, collagen-induced; arb.act.(normal; lightly weakened; weakened; utmost weakened; proc.) = lightly weakened
NPU01372 U—Bilirubins; arb.c.(proc.) = 1
where the scale may depend on the local examination procedure, e.g., {0, 1, 2, 4} or {0, 1}.

Differential scale. Comparison of differences between values has meaning, comparison of ratios does not.

NPU03815 Ecf—Base excess; subst.c.(actual-norm) = −1.7 mmol/l

Logarithmic differential scale. Comparison of differences between logarithmic values has meaning, comparison of ratios has not.

NPU02415 U—Hydrogen ion; pH(proc.) = 6

Rational scale. Comparison of ratios has meaning. This is the most common *quantity-value scale* for measured quantity values.

NPU16917 P—Iron(III); subst.c. = 13 µmol/l

Narrative description. The property value is a regular text with or without standard format or inherent order. For example the descriptions of cells or the sequence variations of genes are narrative.

EXAMPLES
NPU17066 B—Erythrocytes; morphology(proc.) = Many microcytes and a few sickle cells
NPU19039 DNA(spec.)—CFTR gene; seq.var. = The variation: Sweat chloride elevation without cystic fibrosis (CFTR, SER1455TER) is found

Few possible values. Nominal value sets and ordinal, differential, logarithmic differential, or rational scales may be restricted to a few values. Most often they are ordinal scales for values obtained by 'dipstick' examinations or other procedures for fast screening. Nominal or ordinal values obtained by different examination procedures are not comparable. Ordinal, differential, and rational scales of this type are often called 'semiquantitative', but not in the NPU terminology.

EXAMPLES

NPU21368 P—HLA class I antibody; taxon(HLA-A HLA-B HLA-C) = HLA-A
has a nominal value set of {HLA-A, HLA-B, HLA-C}.

NPU01343 U—Barbital; arb.c.(proc.) = 0
could have ordinal scales such as {0, 1} as in this example, or {undetected, indeterminate, detected}, depending on the procedure.

NPU04166 U—Acetoacetate; subst.c. = ? mmol/l = 2 mmol/l
where the scale may be: {<0.5, 2, 7, >10} mmol/l.

Separators between the elements of a value set in a specification to the kind-of-property may vary. In most cases, the separator is a 'blank', but for reasons of readability a comma or a semicolon may be used.

4.5 Measurement unit

The measurement units are primarily from the *International System of Units*, SI [22,23,33]. The seven *base unit*s of the SI (with their corresponding symbols in parentheses) are metre (m), kilogram (kg), second (s), ampere (A), kelvin (K), mole (mol), and candela (cd). The unit one (1) can be regarded as a base unit or a coherent derived unit. In addition, a few of the units accepted for use with the SI are included: litre (L,l), minute (min), hour (h), and day (d).

A prefix is used for decimal factors; these should be scaled by steps of a factor 1000. The SI prefixes centi (c), deci (d), deca (da), and hecto (h) are valid SI prefixes, but are not recommended for use in health care [23].

For units, the letter prefix symbols (…, G, M, k, m, µ, n, p, f, …) apply. In the case of quantities of dimension one, using the unit 'one' (which is usually omitted) and for the WHO 'international unit', exponents of factor 10 are used (…, 10^9, 10^6, 10^3, 10^{-3}, 10^{-6}, 10^{-9}, 10^{-12}, 10^{-15}, …).

Percent, with the symbol "%", for the factor 10^{-2}, is not part of the NPU terminology.

By convention in the NPU terminology only one prefix is to be used in a unit [23,25]. To avoid problems of interpretation, the prefix is part of the numerator, not of the denominator. An exception is combined units when the kg is in the denominator, as the kg is a base unit in the SI.

Thus,

- mmol/kg is a unit for substance content, not µmol/g, as the kg is the base unit;
- µmol/l is a unit for substance concentration, not nmol/ml nor pmol/µl; and
- 10^3/l is a unit for number concentration, not k/l or /ml.

According to the above rules, mg/dl is not used; instead, either mg/l or g/l is recommended as unit for the value.

When values cannot be expressed in SI units or units accepted for use with the SI, this is indicated by the adjective "arbitrary" as a modifier to the kind-of-property.

The unit may be defined by, e.g., a WHO International Standard (IS) as part of the NPU entry. If so, the unit is termed "international unit" (int.unit) by the NPU terminology and is combined with a relevant unit in the denominator, e.g., int.unit/l [37]. The abbreviation IU is not used in the terminology.

EXAMPLE

NPU14578 P—Protein S; arb.subst.c.(imm.; IS 93/590; proc.) = ? × 10^3 int.unit/l
As the unit is defined by a reference, the use of powers of ten is allowed.

When a new WHO International Standard is introduced for a procedure, this redefines the international unit and a new NPU entry must be introduced.

EXAMPLES
NPU01582 P—Choriogonadotropin+beta-chain; arb.subst.c.(IS 75/537; proc.) = ? int.unit/l
NPU19579 P—Choriogonadotropin+beta-chain; arb.subst.c.(IS 75/589; proc.) = ? int.unit/l

If no reference for the unit is given in the NPU entry, the unit is undefined in the context of the entry. At the place for the unit is stated 'procedure defined unit', abbreviated p.d.u. Note that the term "p.d.u." designates a unit of unknown magnitude. Prefixes are not allowed with p.d.u. The laboratory performing the examination is responsible for informing on the local definition of the p.d.u. and on its term or abbreviation.

EXAMPLE
NPU08945 P—Gliadin antibody(IgA); arb.subst.c.(proc.) = ? (p.d.u.)

5. LISTS

When the state of a patient has to be expressed by a set of properties, the NPU coding system provides a 'list'. Such lists may describe, e.g., blood cell classification, glucose tolerance, or susceptibility of microorganisms.

The list header has its own NPU entry and is formatted as a dedicated kind-of-property, with the term 'list' as specification to the kind-of-property*.

EXAMPLES
NPU17992 Lkcs(Pericardialf.)—Leukocyte type; num.fr.(list; proc.)
NPU04197 Pt(aB)—Acid base status; k-o-p(list; proc.)

The dedicated kinds-of-property under a header are intended as examples of the list content. The selection of dedicated kinds-of-property in an actual list is made by the laboratory.

EXAMPLE
NPU12019 P—Androgen; subst.c.(list; proc.)
NPU01252 P—Androstanolone; subst.c. = ? nmol/l
NPU01253 P—Androstenedione; subst.c. = ? nmol/l
NPU04121 P—Dehydroepiandrosterone sulfate; subst.c. = ? µmol/l
NPU14568 P—Dehydroepiandrosterone sulfate; subst.c. = ? nmol/l
NPU01852 P—Prasterone; subst.c. = ? nmol/l
NPU03419 P—Sexual-hormone-binding-globulin; subst.c. = ? nmol/l
NPU03543 P—Testosterone; subst.c. = ? nmol/l
NPU03549 P—Testosterone(free); subst.c. = ? nmol/l

In the example above, the two entries for "dehydroepiandrosterone sulfate" have different units, and the laboratory may use either. Additional entries are added to the list on request, provided they are covered by the list header definition.

Headers of lists may contain information that is missing in the properties listed: these dedicated kinds-of-property are regarded as "context-dependent".

EXAMPLE
NPU14915 Pt—Glucose tolerance; k-o-p(list; glucose p.o.; 120 min)
NPU10574 Pt—Glucose(administered); am.s.(p.o.) = ? mmol
NPU04173 P—Glucose; subst.c.(0 min) = ? mmol/l
NPU04174 P—Glucose; subst.c.(30 min) = ? mmol/l

*In this document "List headers" are indicated by bold type for clarity.

NPU04175 P—Glucose; subst.c.(60 min) = ? mmol/l
NPU04176 P—Glucose; subst.c.(90 min) = ? mmol/l
NPU04177 P—Glucose; subst.c.(120 min) = ? mmol/l

etc.

The defining header NPU14915 informs on a glucose tolerance examination where glucose is administered perorally, and the substance concentration of glucose in plasma is followed for 120 min.

The context-dependent code NPU04175 identifies the glucose concentration in plasma 60 min after the intervention.

NPU04175 is also used to identify the concentration of glucose in plasma 60 min after many other interventions.

NPU02591 Pancreatic beta-cell—Insulin secretion; subst.rate(list; leucine p.o.; proc.)
NPU10598 Pt—Leucine(administered); am.s.(p.o.) = ? mmol
…
NPU08705 P—Insulin; subst.c.(60 min) = ? pmol/l
…
NPU04175 P—Glucose; subst.c.(60 min) = ? mmol/l
…
NPU01790 Adrenal cortex—Cortisol secretion; subst.rate(list; insulin i.v.; proc.)
NPU10547 Pt—Insulin(administered); subst.cont.(i.v.; am.s./body mass) = ? µmol/kg
…
NPU04968 P—Cortisol; subst.c.(60 min) = ? nmol/l
…
NPU04175 P—Glucose; subst.c.(60 min) = ? mmol/l
…

Values associated with context-dependent NPU entries are comparable only if they are part of the same list.

In instances where the property aimed at is an outcome of calculations, the properties that are part of the calculation may be listed.

EXAMPLE
NPU17160 Kidn.—Creatininium clearance; k-o-p(list; proc.)
NPU01809 Kidn.—Creatininium clearance; vol.rate(proc.) = ? ml/s
NPU01808 U—Creatininium; subst.c. = ? µmol/l
NPU18016 P—Creatininium; subst.c. = ? µmol/l
NPU18284 Pt—Urine; vol.rate = ? l/d
…

Note that other clearance studies (Carbamide-, Calcium-, Chromium-EDTA-) are given as single properties.

Clinical laboratories use many other types of grouping or panel, related to a specific clinical situation, sampling (same test tube), or examinations on the same instrument. These vary from laboratory to laboratory, and are not part of the NPU coding system. They are expected to be handled by electronic health records (EHR) or laboratory administrative systems.

6. CLINICAL LABORATORY SCIENCES – SUBJECT FIELDS

Each NPU entry of the NPU terminology is classified according to a subject field or speciality in the domain of clinical laboratory sciences. The classification is to some extent arbitrary as specialities are delineated differently depending on local or national tradition.

6.1 Clinical allergology – ALL

The NPU entries in clinical allergology are concerned with allergens and antibodies to allergens [13]. The allergens designated "NCCLS/xx" refer to preparations described by the NCCLS (now CLSI) [38]. In new entries, "CLSI2009/xx" is used with reference to the catalogue from 2009 [39], as there are inconsistencies between the NCCLS (1997) and CLSI (2009) catalogues. These sources will be replaced by references to IUIS, where possible.

Different providers of examinations for allergen specific immunoglobulin E (IgE) term the allergens and their allergen 'panels' differently. The CLSI reference preparations are used as neutral references for the allergens or combinations of allergens used.

NPU entries for allergens have been made for allergen specific IgE in plasma, for allergen-induced histamine release (HR), and for the size of papules by allergen-induced reactions in the skin ("prick test").

EXAMPLES

NPU11565 P—Pecan antibody(IgE); arb.c.(NCCLS/t22; proc.) = ?
: The allergen t22 is a preparation from the tree Pecan or Hickory, *Carya illinoensis*; the examination may be relevant for allergy to pollen.

NPU11566 P—Pecan nut antibody(IgE); arb.c.(NCCLS/f201; proc.) = ?
: The allergen f201 is a preparation of the tree nuts without shell; may be relevant for food allergy.

NPU14810 P—Animal feather antibody(IgE); arb.c.(NCCLS/(e70; e85; e86; e89); proc.) = ?
: The allergens e70; e85; e86; e89 are preparations of feathers from geese, chicken, duck, and turkey.

NPU11684 P—Apple antibody(IgE); arb.c.(NCCLS/f49; proc.) = ?
: Antibody to apple, expressed on an ordinal scale

NPU13437 P—Apple antibody(IgE); arb.subst.c.(NCCLS/f49; proc.) = ? (p.d.u.)
: Antibody to apple, expressed in procedure defined units

NPU19564 Basocs(B)—Apple induced HR; arb.c.(NCCLS/f49; proc.) = ?
: Histamine release (HR) induced by apple, expressed on an ordinal scale

NPU22244 Skin(spec.)—Apple induced papule; diam.(proc.) = ? mm
: Diameter of papule induced by the intracutaneous injection of apple extract

NPU27728 P—Anisakis antibody(IgE); arb.subst.c.(IRP 75/502; CLSI2009/p4) = ? × 10^3 int.unit/l
: Reference to a preparation (p4) from the 2009 CLSI catalogue

6.2 Clinical pharmacology – CLP

This discipline is mostly concerned with properties related to drugs not normally present in the human organism. [11]. This listing of properties has been worked out in collaboration with clinical pharmacologists from the Drug Control Centre, London University, King's College, London, UK and from Institut Municipal d'Investigació Mèdica, Barcelona, Spain.

EXAMPLES
NPU01713 U—Codeine; subst.c. = ? µmol/l
NPU23591 U—Codeine; mass c. = ? µg/l
NPU19757 Pt—Doxepin(administered); mass rate(p.o.) = ? mg/d
NPU01924 P—Doxepin; subst.c. = ? nmol/l

NPU18011 P—Doxepin; subst.c.(list)
NPU01924 P—Doxepin; subst.c. = ? nmol/l
NPU10304 P—Desmethyldoxepin; subst.c. = ? nmol/l
NPU03934 P—Doxepin+desmethyldoxepin; subst.c. = ? nmol/l

NPU01345 P—Barbiturate; taxon(proc.) = ?
The value could be, e.g., 'Pentobarbital'.

6.2.1 Properties examined in keeping with International Olympic Committee (IOC) rules

Most procedures in doping control are based on primary reference measurement procedures, such as mass spectrometry, and are hence suited exceptionally well to the kind-of-property 'substance concentration' and to the SI unit mol/l. Based on a detection limit, such values are frequently converted to the binary expression (0, 1) in an IOC screen [6]. The terminology comprises entries both for the introductory screening of samples and entries for eventual confirming procedures. These NPU entries have not been accepted for use by the IOC doping control laboratories, and have therefore been retired. The entries may, however, be restored as needed.

EXAMPLES
NPU01002 U—Acebutolol; arb.c.(IOC Confirm; 0 1) = ?
NPU01001 U—Acebutolol; arb.c.(IOC Screen; 0 1) = ?
NPU04833 U—beta-2-Agonist; taxon(IOC Screen) = ?
NPU04768 U—Stimulating drug; taxon(IOC Screen) = ?

6.3 Clinical chemistry – CLC

This subject field comprises chemical and biochemical properties in general [8,9]. The kind-of-property is usually 'substance concentration' for stoichiometric reasons.

Whenever possible, cell counts should be reported as 'number concentration'. In some counts, the values are just numbers (not number concentrations) obtained by use of a particular measurement procedure, e.g., urine sediment microscopy.

There are lists for types of leukocyte in keeping with the classical differential count. Some components in these lists have the specification "unspecified". They are intended for cells that cannot be classified as a particular type. From a semantic point of view, the term 'unspecified' is indeterminate as the meaning depends on the other types classified.

EXAMPLE
NPU17992 Lkcs(Pericardialf.)—Leukocyte type; num.fr.(list; proc.)
NPU18307 Lkcs(Pericardialf.)—Basophilocytes; num.fr. = ?
NPU18308 Lkcs(Pericardialf.)—Eosinophilocytes; num.fr. = ?
NPU10758 Lkcs(Pericardialf.)—Leukocytes(mononucl.); num.fr. = ?
NPU18094 Lkcs(Pericardialf.)—Leukocytes(polynucl.); num.fr. = ?
NPU18095 Lkcs(Pericardialf.)—Leukocytes(unspecified); num.fr. = ?
…

"Ratio" appears in dimension-one kinds-of-property terms such as "substance ratio" and "mass ratio", indicating the ratio between quantities regarding two components of the same kind-of-quantity in a given system. The value may be both greater or smaller than one (1), but is always positive or zero.

EXAMPLE
NPU01502 U—Carnitine/Creatine; subst.ratio = ?

NPU entries are not defined for quotients between mass and amount of substance, with units, e.g., g/mol. Example: albumin mass concentration in urine divided by the substance concentration of creatininium in the same system. A quotient of this type should be replaced by either a substance ratio or a mass ratio, or be coded locally.

If the ratio is concerned with the relation between ratios in two different systems, e.g., the ratio Immunoglobulin G/Albumin in cerebrospinal fluid and in plasma, respectively, the modifier "relative" is included in the kind-of-property term and the two systems are given as a specification.

EXAMPLE
NPU04029 Csf—Immunoglobulin G/Albumin; rel.subst.ratio(Csf/P) = ?

Csf	The system cerebrospinal fluid
Immunglobulin G/Albumin	Ratio between the components 'IgG' and 'albumin'
relative substance ratio	Substance ratio (in Csf) divided by the substance ratio in another system
(Csf/P)	Ratio for cerebrospinal fluid divided by the ratio in plasma

The concept 'fraction' (substance fraction, mass fraction, number fraction, etc.) means that a component is a part of its parent system as the total, both described by the same kind-of-property. Fractionated measurement of enzymes and the classical haematological differential count are typical examples. The value in these cases cannot be greater than one (1).

EXAMPLES
NPU01473 Hb(Fe; B)—Carbon monoxide haemoglobin(Fe); subst.fr. = ?
NPU21782 Lymcs(B)—B-lymphocytes(mature); num.fr. = ?

Measurement on a urine sample collected over a period of 24 h, '24-hour urine', concerns the excretion per day. In the NPU terminology they are given the kind-of-property substance rate or mass rate and a unit indicating amount per 24 h. The system is Patient(Urine)—, the actual collection period is not part of the system but of the procedure.

EXAMPLE
NPU14043 Pt(U)—Adrenalinium; subst.rate(proc.) = ? µmol/d

There are NPU entries describing the duration of sample collection so that 24-h values may be calculated from other durations.

EXAMPLES
NPU10379 Pt—Urine sampling; duration = ? h
NPU10380 Pt—Urine sampling; duration = ? d

6.3.1 Acid-base-gas properties

A number of NPU entries have been made for acid-base-gas dedicated kinds-of-property in a series of subsystems of blood and plasma. They are assembled in panels containing traditional quantities.

EXAMPLE
NPU04197 Pt(aB)—Acid base status; k-o-p(list; proc.)
NPU12518 P(aB)—Base excess; subst.c.(actual-norm) = ? mmol/l
NPU03815 Ecf—Base excess; subst.c.(actual-norm) = ? mmol/l
NPU01471 P(aB)—Carbon dioxide; subst.c. = ? mmol/l
NPU12474 P(aB)—Hydrogen ion; pH(37 °C) = ?
etc.

The expression "oxygen saturation" covers several related concepts, and an NPU entry has to be selected according to what is actually measured.

EXAMPLES
NPU03013 Hb(Fe; tot.; aB)—Oxyhaemoglobin(Fe); subst.fr. = ?
identifying a substance fraction calculated by dividing the substance concentration of oxyhaemoglobin by the total haemoglobin substance concentration.
NPU03011 Hb(Fe; O_2-bind.; aB)—Oxygen(O_2); sat. = ?
'Saturation' (sat.) here expresses the substance concentration of haemoglobin-bound oxygen molecules divided by the substance concentration of all available oxygen-binding sites in the total haemoglobin of arterial blood.

6.4 Clinical immunology and blood banking – IMM

This subject field is concerned with autoimmune antibodies, as well as antigens and antibodies related to blood cells [15].

Traditionally, results of grouping for ABO and Rh D antigens are conceived as one result; hence, a single NPU entry applies.

EXAMPLE
NPU01945 Ercs(B)—Erythrocyte antigen; taxon(ABO; Rh D; proc.) = ?

Sometimes a particular procedure is used for the examination for ABO and Rh D blood groups, termed reverse examination of plasma for identification of ABO and Rh D antibodies in the plasma of the patient. NPU entries for this specific purpose are:

EXAMPLES
NPU26678 Ercs(B)—Erythrocyte antigen; taxon(ABO; Rh D; incl. reverse proc.) = ?
NPU26679 Ercs(B)—Erythrocyte antigen; taxon(ABO; Rh D; without reverse proc.) = ?

Examination for irregular blood group antibody in plasma is usually initially reported only by a single value of screening; the value does not specify the type of antibody; it just indicates present or not present.

EXAMPLE
NPU26690 P—Erythrocyte(not ABO) antibody; arb.c.(proc.) = ?

If the result of screening indicates the presence of one or more irregular antibodies, these are identified and so are their corresponding blood group antigens. Values concerning the specific antibodies are given on an ordinal scale.

EXAMPLES
NPU20426 P—Erythrocyte A1 antibody; arb.c.(37 °C; proc.) = ?
and for the corresponding antigen
NPU21914 Ercs(B)—Erythrocyte A1 antigen; arb.num.(proc.) = ?

In both cases, the scale may be (not present, present) or (0, 1).

Prior to blood transfusion, the plasma of the patient (recipient) is examined in vitro for compatibility with the erythrocytes of the blood donor ("major compatibility test").

EXAMPLE
NPU21913 P—Erythrocyte antibody; compatibility(Ercs; donationID; absent present) = ?
The specification (donationID; etc.) indicates that the result of the compatibility study is on a particular identified portion of blood. If needed clinically, information on the procedure used is provided by the laboratory.

Compatibility tests are made also on other cell types.

EXAMPLE
NPU21755 Trcs(B)—Thrombocytes; compatibility(P; donationID; absent present) = ?

An examination for irregular antibody in the plasma of a patient is valid only for a certain period of time (BAS/BAC test). An expiry date is often given for 'electronic compatibility', validated according to information already present in the IT system of the laboratory. The value is a date and a time.

EXAMPLE
NPU21406 B—Crossmatch(electr.); expiry(d&h; proc.) = 2001-01-23 T16:00
Expiry date for the performed screening for antibody as the basis for delivery of blood donations

The outcome of the 'direct antiglobulin test' (DAT; formerly termed "Coombs test") is often given the values (not present, present) or (0, 1, 2, 3).

EXAMPLE
NPU20025 Ercs(B)—Complement+immunoglobulin; arb.num.(proc.) = ?
Positive outcomes such as 1, 2, or 3 indicate that the patient's erythrocytes have bound immunoglobulin and/or complement, but does not indicate the number of each of the two bound to the erythrocytes.

For further examination of a positive DAT there is a list specifying the antigens and/or complement factors bound to erythrocytes.

EXAMPLE
NPU20024 Ercs(B)—Complement+immunoglobulin; arb.num.(list; proc.)
NPU20025 Ercs(B)—Complement+immunoglobulin; arb.num.(proc.) = ?
NPU20026 Ercs(B)—Complement C3b; arb.num.(proc.) = ?
NPU26800 Ercs(B)—Complement C3c; arb.num.(proc.) = ?
NPU20027 Ercs(B)—Complement C3d; arb.num.(proc.) = ?
NPU20175 Ercs(B)—Immunoglobulin; arb.num.(proc.) = ?
NPU20028 Ercs(B)—Immunoglobulin A; arb.num.(proc.) = ?
…

6.5 Clinical microbiology – MIC

This subject field is concerned with the properties of microorganisms and related antibodies [7].

EXAMPLES
NPU12455 Csf—Adenovirus; arb.c.(proc.) = ?
NPU12460 Csf—Adenovirus(ag); arb.c.(proc.) = ?
NPU14457 Csf—Adenovirus(DNA); arb.c.(proc.) = ?
NPU09304 Csf—Adenovirus; taxon(proc.) = ?
NPU18930 Csf—Adenovirus antibody(IgG); arb.subst.c.(proc.) = ? (p.d.u.)

Due to the limited granularity of the NPU system, the exact anatomical site from where a sample originates (e.g., left or right side) must in some cases be given in the sampling documentation.

EXAMPLE
NPU06693 Secr(Ear canal; spec.)—Bacterium; arb.c.(proc.) = ?

The susceptibility to antibiotics of a microorganism detected is given as a list where the context dependent NPU entries have "System" as system. The susceptibility value could be "resistant", "intermediate", or "sensitive", often symbolized R, I, S.

EXAMPLE
For a specific bacterium identified as
NPU06085 Secr(Urethra)—Bacterium; taxon(proc.) = ?
the susceptibility may be reported using the list:
NPU13745 Secr(Urethra)—Bacterium(spec.); suscept.(list; ord.sc.; proc.)
NPU06050 Syst—Erythromycin; suscept. = ?
NPU07422 Syst—Oxacillin; suscept. = ?
NPU06008 Syst—Penicillin G; suscept. = ?
NPU06029 Syst—Penicillin V; suscept. = ?
etc.

For other bacteria identified in the same system, the same list NPU13745 applies. The information connecting each instance of the list NPU13745 with a specific bacterium has to be supplied by the report structure.

6.6 Molecular biology and genetics – MBG

This subject field embraces the study of genes, chromosomes, and some biochemical examinations related to specific genetic defects of metabolism [14].

The terms for genes follow the nomenclature of the HUGO Gene Nomenclature Committee (HGNC). The nomenclature has a term and a symbol for each gene.

The gene symbols are used and "gene" is added as suffix. The kind-of-property 'sequence variation' indicates possible variations in a particular sequence of DNA of a particular gene as recommended by den Dunnen and Antonarakis [40].

EXAMPLE
Term for gene: cystic fibrosis transmembrane conductance regulator (ATP-binding cassette subfamily C, member 7)
Gene symbol: CFTR
Coded dedicated kind-of-property term with outcome:
NPU19039 DNA(spec.)—CFTR gene; seq.var. = NM_000492.2: c1654_1656delTTT

A few NPU entries have been made for common allele variants of particular genes. These allelic variants are identified using the MIM (Mendelian Inheritance in Man) codes of the gene and the MIM allelic variant number.

EXAMPLE
NPU19280 DNA(spec.)—CFTR gene(MIM602421.0086); entitic num.(0 1 2) = ?
where 0 means the variant is not present, 1 and 2 indicates the number of variants in the genome.

6.7 Reproduction and fertility – RAF

This subject field is concerned with the functions of reproduction, primarily studies related to semen, cervical mucus, and their interaction. The properties listed are according to the WHO laboratory manual for the examination of human semen and sperm–cervical mucus interaction [41] and have been formulated in collaboration with the International Society of Andrology [12].

EXAMPLES
NPU03459 Sperms—Spermatozoa(live); num.fr.(proc.) = ?
NPU01525 CerMu—Consistency; arb.viscosity(proc.) = ?

6.8 Thrombosis and haemostasis – TAH

This subject field comprises the study of thrombocytes, coagulation, and fibrinolysis. Many of the properties are defined functionally, and the procedures are often specified to pinpoint the property aimed at. The properties of this field were defined in collaboration with the Scientific and Standardization Committee of the International Society on Thrombosis and Haemostasis [5].

EXAMPLES
NPU08950 Trcs(B)—ATP release, arachidonate induced; am.s.(proc.) = ? nmol
NPU01664 P—Coagulation factor XI; rel.subst.c.(imm.; actual/norm; proc.) = ?
NPU26883 B—Coagulation; arb.act.(thrombelastography) = ?
NPU01675 P—Coagulation factor XIII antibody; arb.c.(proc.) = ?
NPU03567 P—Thrombocyte factor 4; subst.c. = ? pmol/l
NPU03190 P—Plasminogen activator inhibitor 2; arb.subst.c.(imm.; proc.) = ? (p.d.u.)

6.9 Toxicology – TOX

This subject field concerns properties involving exogenous toxic compounds, present in the patient or his close surroundings [11,16].

EXAMPLES
NPU16601 Food(spec.)—Cyanide; subst.cont. = ? µmol/kg
NPU04780 B—Cyanide; subst.c. = ? µmol/l
NPU16508 Air(amb)—Aldrin; subst.c. = ? mmol/m^3
NPU16519 P—beta-Amanitin; subst.c. = ? µmol/l

The distinction between toxicological and pharmacological properties is not well defined.

7. MAINTENANCE OF TERMINOLOGY

Requests for new NPU entries from clinical laboratories are forwarded to the NPU terminology manager. A request should include information on area of use, technical information on procedure, reference preparation, and suggested terms for system, component, kind-of-property, and any unit.

In principle, the definition and meaning of an NPU entry cannot be changed. It may be part of the information in a medical record and hence has to retain its meaning. The following modifications are, however, allowed:

- Correction of errors of spelling of terms or change of terms for specific microorganisms and the like.
- In lists, NPU entries may be added if they relate to the header of the list.
- Examination procedures specified in the NPU entries cannot be altered or discarded, but minor changes are allowed if they expand the range of use. For example, if the procedure indicates the use of "carbamide" at the date of definition of the dedicated kind-of-property, because "carbamide" was the only inhibitor available, change to the more general term "inhibitor" is acceptable because it does not change the meaning. The reverse change from "inhibitor" to "carbamide" is not accepted in that it restricts the definition, so that existing examination results may be misinterpreted.

Ambiguous or poorly defined NPU entries are not changed, but are retired and replaced.

8. FORMAT FOR PROPERTIES IN PRINTED IFCC–IUPAC PUBLICATIONS

In current formal IFCC–IUPAC publications on the application of the NPU principles in various fields of laboratory medicine, a fully defined entry has been printed in a specific format [1].

Note that it is the content of concepts in the context of the syntax that defines the meaning of the NPU entry, not the orthography or format.

The dedicated kind-of-property term, measurement unit, and code are given in boldface type, and other information in lean type, as illustrated below. The items system, component, kind-of property, and code are mandatory, other items are optional.

1 Term for system and any parenthetic specification, spelled out in full, and followed by a long dash (em dash)
2 alphanumeric chemical prefixes to component term
3 Term for component with parenthetic specification; shifted to the left for visual searching, and followed by a semicolon
4 kind-of-property with parenthetic specification
5 measurement unit
6 Molar mass of component
7 Calibrator
8 Other term(s)
9 Authority: the code for the component given by the international body serving as reference
10 Note(s) with any further information
11 Code: international coding scheme identifier and *code value*, intended for electronic transmission
12 Entry in formalized abbreviated form

EXAMPLES

Plasma—
Glucose;
substance concentration
millimole per litre
M = 180.2 g/mol
Authority: CAS50-99-7
NPU02192
P—Glucose; subst.c. = ? mmol/l

Plasma—
alpha-1-
Fetoprotein;
arbitrary substance concentration(IS 72/225; procedure)
10^3 international unit/litre
M = 69 000 g/mol
Calibrator: WHO 1st IS 72/225
NPU02043
alpha-1-Fetoprotein; arb.subst.c.(IS 72/225; proc.) = ? × 10^3 int.unit/l

9. SOURCES FOR CONCEPTS AND TERMS

The words used in the definitions are terms from international vocabularies with well documented concept definitions. The following sources are the most important.

Concept field	Terminology	Source of code value	NPU abbreviation
Bacteria	Bacterial taxonomy and nomenclature	The American Type Culture Collection (from 2010 replaced by National Center for Biotechnology Information (NCBI) taxonomy database)	ATCC
Measurement units	Bureau International des Poids et Mesures	No individual code values	BIPM
Chemical substances (not enzymes or proteins)	Chemical Abstracts Service	CAS registry	CAS
Allergens	Clinical and Laboratory Standards Institute (formerly NCCLS)	Clinical and Laboratory Standards Institute – Approved Guideline I/LA20-A2	CLSI
Allergens	WHO/IUIS Allergen Nomenclature	IUIS Nomenclature Subcommittee database (to replace use of CLSI codes when possible)	IUIS
Enzymes	International Union of Biochemistry and Molecular Biology, Enzyme Committee	Enzyme Committee codes	EC
Human genes	HUGO Gene Nomenclature Committee	HGNC gene database	HUGO
Blood groups	International Society of Blood Transfusion	ISBT 128	ISBT
Chemical concepts	International Union of Pure and Applied Chemistry	No individual concept IDs	IUPAC
Allelic variants of genes	Mendelian Inheritance in Man	OMIM database	MIM
Medical concepts in general and substances that are chemically undefined	Medical subject headings	MeSH Unique ID	MSH

Concept field	Terminology	Source of code value	NPU abbreviation
Living organisms	Taxonomies for living beings	NCBI taxonomy database	NCBI
Supplementary concepts implicitly or explicitly defined only by C-SC-NPU.	Committee and Subcommittee on Nomenclature for Properties and Units	List of NPU elements	QU
Proteins and peptides	UniProt nomenclature	UniProt knowledgebase	UP
Reference preparations	World Health Organization, International Biological Reference Preparations	WHO International Reference Preparation	WHO

10. VOCABULARY

The first time a concept defined in the *vocabulary* is mentioned in this document, or in the definition or note of a given entry in the vocabulary, the term is given in italics.

base unit

measurement unit that is adopted by convention for a base quantity [19]

code

combination of an international coding scheme identifier and a code value

NOTE: The *definition* applies to this document.

code value

alphanumeric string identifying a *concept* in a *terminology* or a database

NOTE: The *definition* applies to this document.

coding scheme

collection of rules that maps the elements of one set on to the elements of a second set [17]

component

part of a *system* [28]

EXAMPLE
NPU02192 P—Glucose; subst.c. = ? mmol/l
The component ‘Glucose’ in the system ‘Plasma’.

concept

unit of knowledge created by a unique combination of characteristics [20]

dedicated kind-of-property

kind-of-property with given sort of *system* and any pertinent sort of *component* [28]

NOTE 1: The NPU terminology defines dedicated kinds-of-property in the *subject fields* of the clinical laboratory sciences

EXAMPLE

NPU04001 F—Parasite(spec.); length(average) = ? mm

length (kind-of-property) in Faeces (sort of system) of a Parasite (sort of component)

NOTE 2: For brevity in common language, the term "property" is frequently used for 'dedicated kind-of-property', when there is no risk of misunderstanding.

definition

representation of a *concept* by a descriptive statement which serves to differentiate it from related concepts [20]

entitic, adj.

modifier indicating that a numerator *kind-of-quantity*, usually extensive, is divided by number of similar entities (modified from [25])

NOTE: The modifier marks the kind-of-quantity as related to a single of many similar parts. In the NPU *terminology* it indicates the average for a single element or particle, usually a cell.

EXAMPLE

NPU01944 B—Erythrocytes; entitic vol. = ? fl

examination

process of obtaining one or more values that can reasonably be attributed to a *property* [28]

International Coding Scheme Identifier (ICSI)

unique identifier for a registered *coding scheme* for use in information interchange (modified from [17])

EXAMPLE

NPU (coding scheme of the Committee-Subcommittee on Nomenclature for Properties and Units)

International System of Units (SI)

system of units, based on the International System of Quantities, their *terms* and symbols, including a series of prefixes and their terms and symbols, together with rules for their use, adopted by the General Conference on Weights and Measures (CGPM) ([19], except for using 'term' instead of 'name')

kind-of-property

common defining aspect of mutually comparable *properties* [28]

kind-of-quantity

aspect common to mutually comparable *quantities* ([19], except for using hyphens in the term)

measurement

process of experimentally obtaining one or more quantity values that can reasonably be attributed to a *quantity* [19]

measurement unit

real scalar *quantity*, defined and adopted by convention, with which any other quantity of the same kind can be compared to express the ratio of the two quantities as a number [19]

NPU entry

coded dedicated kind-of-property in the NPU terminology

NOTE: The commonly used representation of an NPU entry is a string combining the *code* and an abbreviated form of the dedicated kind-of-property. Additional information, e.g., data history, is included in the total entry.

EXAMPLES

NPU03567 P—Thrombocyte factor 4; subst.c. = ? pmol/l

NPU14578 P—Protein S; arb.subst.c.(imm.; IS 93/590; proc.) = ? × 10^3 int.unit/l

object

anything perceivable or conceivable [20]

procedure

description of the way to carry out an activity or a process ([22], modified)

NOTE: In the NPU *terminology*, an examination procedure, e.g., "immunological", may be specified in a *dedicated-kind-of-property*, for delimitation of the *property* described. The *term* "procedure", when used as a specification to a *kind-of-property*, indicates that supplementary information on the examination procedure is necessary to fully define the dedicated-kind-of-property. This information should be available from the laboratory performing the *examination*.

property

inherent state- or process-descriptive feature of a *system* including any pertinent *components* [28]

NOTE 1: Some *properties*, e.g., the colour of an object, may be observed directly, others are examined by physical or chemical procedures. In clinical *examinations*, the property studied is usually a property of a patient or part of a patient.

EXAMPLE
mass of Peter's body on 2009-04-06 at 09:00 = 51.6 kg
NOTE 2: In common language, the term "property" is sometimes used as a convenient short term for *dedicated kind-of-property*

quantity

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed as a number and a reference [18]

quantity-value scale

measurement scale
ordered set of quantity values of *quantities* of a given *kind-of-quantity* used in ranking, according to magnitude, quantities of that kind [18]

subject field

field of special knowledge [20]

EXAMPLE
Clinical immunology

syntax

grammatical arrangement of words, showing their connection and relation [42]

NOTE: The syntax of the NPU *definitions* specifies the way that the individual *terms*, symbols, or signs are arranged, giving each element a specific significance.

system

part or phenomenon of the perceivable or conceivable world consisting of a demarcated arrangement of a set of elements and a set of relations or processes between these elements [28]

taxon

nominal *kind-of-property* indicating classification of *properties* according to nominal property values of a given nominal property value set [29]

EXAMPLES
The set of systematic *terms* for microorganisms (e.g., *Listeria monocytogenes*) or for drugs (e.g., acetazolamide).
Colour does not belong to the kind-of-property taxon, in that the values, e.g., red, yellow, colourless, are not part of a systematized taxonomy for colours.

term

verbal designation of a general *concept* in a specific *subject field* [20]

terminology

set of designations belonging to one special language [20]

EXAMPLE
NPU terminology

vocabulary

terminological dictionary which contains designations and *definitions* from one or more specific *subject fields* [23]

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ABBREVIATIONS

adj	adjective
Ag	antigen
ATCC	American Type Culture Collection
BIPM	Bureau International des Poids et Mesures
CAS	Chemical Abstract Service
CEN	Comité Européen de Normalisation; European Committee for Standardisation
CLSI	Clinical and Laboratory Standards Institute (formerly NCCLS)
C-NPU	Committee on Nomenclature for Properties and Units (of IFCC)
C-QU	Commission on Quantities and Units (of IFCC)
C-QUCC	Commission on Quantities and Units in Clinical Chemistry (of IUPAC)
C-SC-NPU	Committee and Subcommittee on Nomenclature for Properties and Units (of IFCC and IUPAC)
EC	Enzyme Committee (of IUBMB)
EPQU	Expert Panel on Quantities and Units (of IFCC)
HGNC	HUGO Gene Nomenclature Committee
HUGO	Human Genome Organisation
ICSI	International Coding Scheme Identifier
ID	string or number used in information technology as a unique identifier for an item of a set
IEC	International Electrotechnical Commission
IFCC	International Federation of Clinical Chemistry and Laboratory Medicine
IOC	International Olympic Committee
IRP	International Reference Preparation (from WHO)
ISBT	International Society of Blood Transfusion
IT	information technology
IUBMB	International Union of Biochemistry and Molecular Biology
IUIS	International Union of Immunological Societies
IUPAC	International Union of Pure and Applied Chemistry
MIM	Mendelian Inheritance in Man
NCBI	National Center for Biotechnology Information
NCCLS	National Clinical Chemistry Laboratory Standards (now CLSI)
NPU	Nomenclature for Properties and Units
OMIM	Online Mendelian Inheritance in Man
QU	Quantities and Units
SC-NPU	Subcommittee on Nomenclature for Properties and Units (of IUPAC)
WHO	World Health Organization

