



The Long-range Research Initiative

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CEFIC LRI Project EEM9.3

IUCLID Substance Data

IUCLID substance Identity Concept
Extracting data from IUCLID

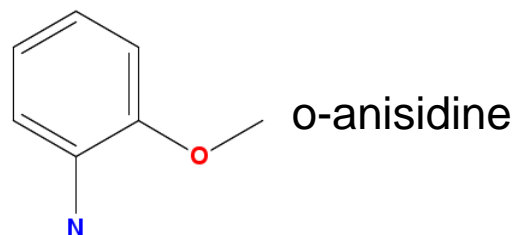
Public

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Starting position

Difference – structure - substance

- A chemical **structure** describes a well-defined molecule.



- Chemicals synthesized in reality are no pure substances. In fact such substances represent mixtures of several components. Therefore real substances can not be associated with an unique structure. In contrast, components (i.e.: constituents, impurities and/or additives) can clearly be characterized by a defined structure in each case.
- Under REACH, the concept of substance is clearly described. These definition is implemented in the IUCLID data base.

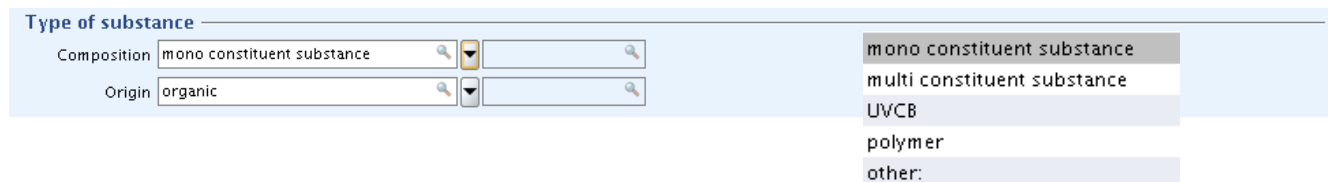
Substances under REACH

➤ under REACH, a chemical substance is composed of:

➤ **Constituents** ($n \geq 1$)

➤ **Impurities** ($n \geq 0$)

➤ **Additives** ($n \geq 0$)



Type of substance	
Composition	mono constituent substance
Origin	organic

- mono constituent substance
- multi constituent substance
- UVCB
- polymer
- other:

➤ under REACH, a chemical substance can have several compositions, e.g. crude, distilled, etc.

➤ under REACH, the type of a chemical substance can be:

➤ Either **mono-constituent** (a substance, defined by its composition, in which one main constituent is present to at least 80% (w/w)).

➤ Or **multi-constituent** (a substance, defined by its composition, in which more than one main constituent is present in a concentration 10% (w/w) and < 80% (w/w))

➤ Or **UVCB** (Substance of Unknown or Variable composition, Complex reaction products or Biological materials)

REACH substance definition implemented in IUCLID

Example: mono-constituent substance

Substance composition

Diethylene glycol dimethyl ether	⌵ ⌶ ⌵ ⌶ ⌵
Crude Diglyme	⌵ ⌶ ⌵ ⌶ ⌵

Diethylene glycol dimethyl ether

Name: Diethylene glycol dimethyl ether

Brief description: Diglyme, pure product for commercialisation

Composition ID: L-51c5a52a-1ed4-3664-b781-558ff6f02dea

Degree of purity

EU: REACH

>= 99 % (w/w)

Constituents

>= 99.9 % (w/w) bis(2-methoxyethyl) ether / 1-methoxy-2-(2-methoxyethoxy)ethane / 111-96-6	⌵ ⌶ ⌵ ⌶ ⌵
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Impurities

	⌵ ⌶ ⌵
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Additives

ca. 100 ppm 2,6-di-tert-butyl-p-cresol / 2,6-di-tert-butyl-4-methylphenol / 128-37-0	⌵ ⌶ ⌵ ⌶ ⌵
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Two different compositions

mono-constituent

REACH substance definition implemented in IUCLID

Example: multi-constituent substance

Substance composition

Phosphoric acid, butyl ester

Name: Phosphoric acid, butyl ester

Brief description:

Composition ID: L-781320fa-285d-495d-91e5-65d4d4042047

Degree of purity

ca. 99 % (w/w)

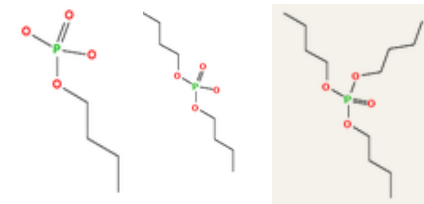
Constituents

>= 35— <= 70 % (w/w) butyl dihydrogen phosphate / butyl dihydrogen phosphate / Phosphoric a...	⌵ ⌶ ⌷ ⌸ ⌹
>= 10— <= 50 % (w/w) dibutyl hydrogen phosphate / Phosphoric acid dibutyl ester / Phosphoric a...	⌵ ⌶ ⌷ ⌸ ⌹
> 0— < 1 % (w/w) tributyl phosphate / tributyl phosphate / Phosphoric acid tributyl ester / 126-73...	⌵ ⌶ ⌷ ⌸ ⌹
> 0— <= 15 % (w/w) pyrophosphoric acid, butyl esters / pyrophosphoric acid, butyl esters	⌵ ⌶ ⌷ ⌸ ⌹

Impurities

0— <= 13 % (w/w) orthophosphoric Acid / phosphoric acid / Phosphoric acid / 7664-38-2	⌵ ⌶ ⌷ ⌸ ⌹
> 0— <= 5 % (w/w) butan-1-ol / butan-1-ol / 1-Butanol / 71-36-3	⌵ ⌶ ⌷ ⌸ ⌹
> 0— < 0.1 % (w/w) unknown impurities / unknown	⌵ ⌶ ⌷ ⌸ ⌹

In this case, the substance has 4 constituents and 3 impurities, and these are characterized by the different structures




Only 3 are shown

Detailed information Composition (1)

Every constituent, impurity and additive is described in detail with a “Reference substance” with several identifiers

>= 35 — <= 70 % (w/w) butyl dihydrogen phosphate / butyl dihydrogen phosphate / Phosphoric acid, monobutyl ester / 1623-15-0

Reference substance  butyl dihydrogen phosphate / butyl dihydrogen phosphate / Phosphoric acid, monobutyl ester / 1623-15-0

EC number	EC name
216-604-4	butyl dihydrogen phosphate
CAS number	CAS name
1623-15-0	Phosphoric acid, monobutyl ester
IUPAC name	
butyl dihydrogen phosphate	

Typical concentration

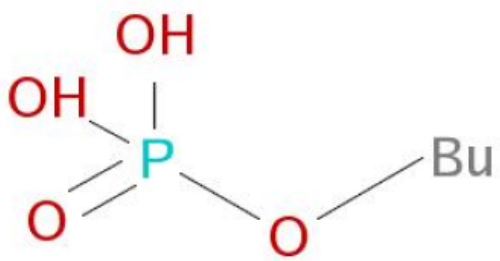
Concentration range >= 35 <= 70 % (w/w)

Remarks

Detailed information Composition (2)

The structure associated to the reference substance is stored in the IUCLID data base as a picture format only which is normally not searchable.

Molecular and structural information

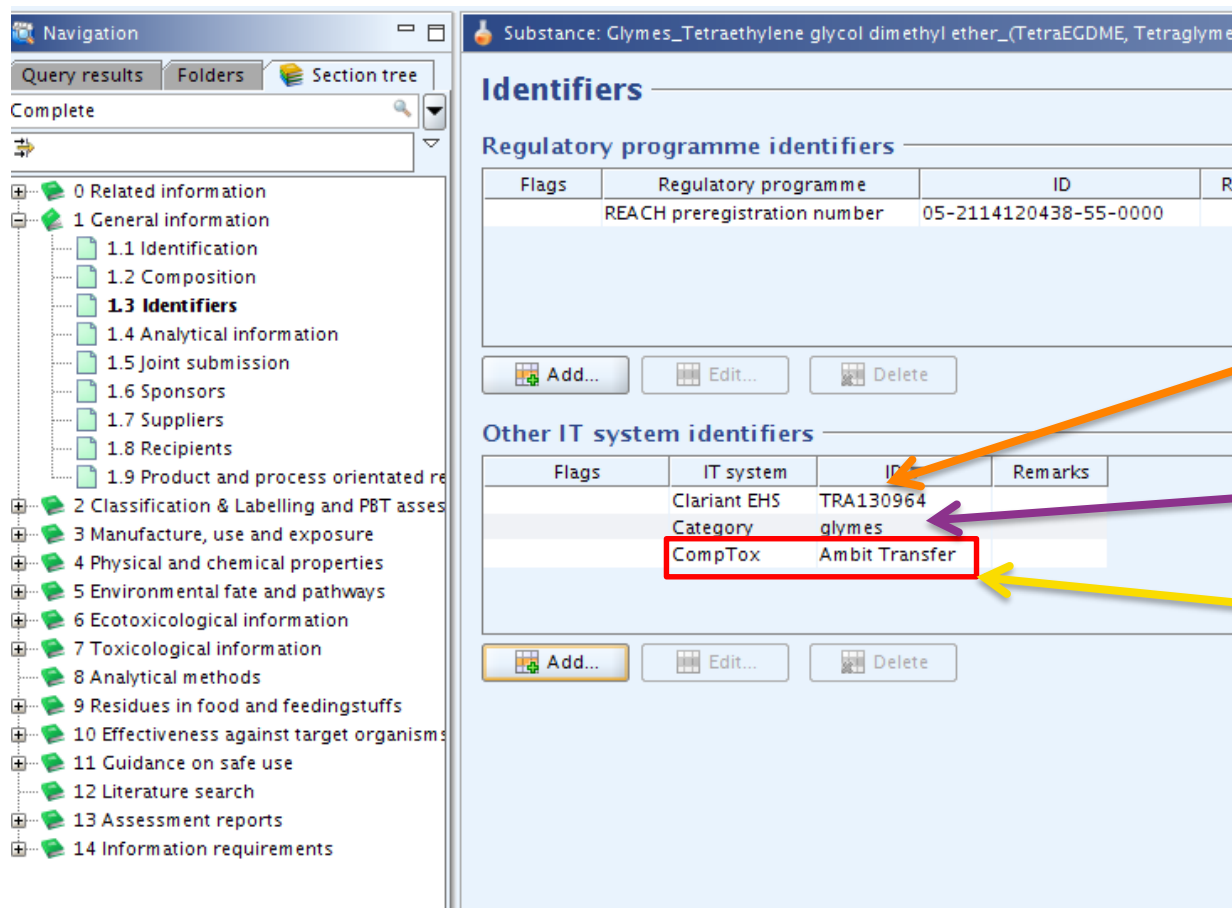
Molecular formula	C4H11O4P
Molecular weight range	<input type="text" value="154.1015"/>
SMILES notation	OP(=O)(O)OCCCC
InChI	InChI=1/C4H11O4P/c1-2-3-4-8-9(5,6)7/h2-4H2,1H3,(H2,5,6,7)
Structural formula	

Motivation to transfer IUCLID data to the chemoinformatic system Ambit

- IUCLID Limitation:
 - IUCLID allows queries in the substance data but has no functionality to search chemical structures (exact, similar, or substructures). Only a query using the SMILES notation is possible.
 - In addition, IUCLID describes endpoints in very detailed complexity. Extraction of key information relevant for substance evaluation is not convenient.
- The IUCLID substance composition and 43 IUCLID endpoint data can be transferred and updated into the Ambit system. During this process structures are assigned automatically to the constituents/impurities/additives of the substance.
- In contrast to IUCLID, Ambit allows structure **and** data search.

Extracting data from IUCLID

- Substances which should be transferred to AMBIT have to be flagged in IUCLID
- In the IUCLID chapter “1.3 Identifiers” company specific flags can be added



Substance: Glymes_Tetraethylene glycol dimethyl ether_(TetraEGDME, Tetraglyme)

Identifiers

Regulatory programme identifiers

Flags	Regulatory programme	ID	Re
	REACH preregistration number	05-2114120438-55-0000	

Buttons: Add... Edit... Delete

Other IT system identifiers

Flags	IT system	ID	Remarks
	Clariant EHS	TRA130964	
	Category	glymes	
	CompTox	Ambit Transfer	

Buttons: Add... Edit... Delete

Company specific flags examples:

TRA number to identify trade products in the SAP System

Grouping of substances

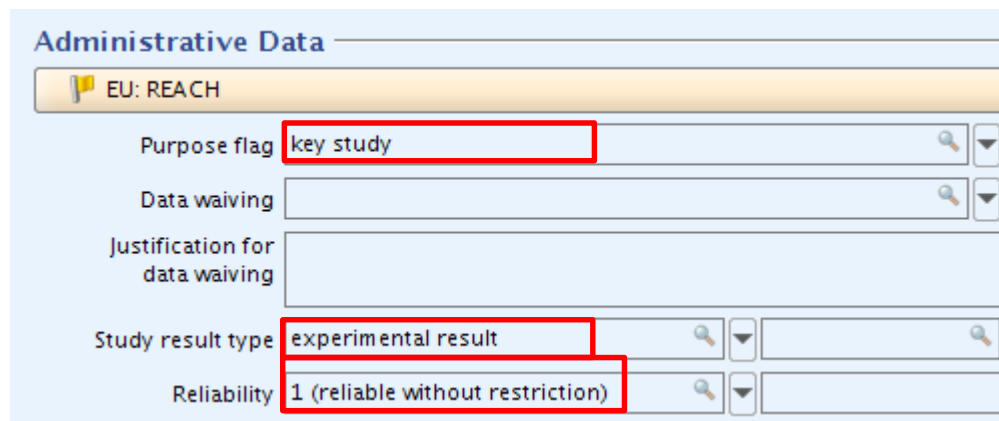
Substances will be transferred to Ambit (CompTox – Ambit Transfer)

All Flags will be transferred to Ambit and are searchable in Ambit

Import criteria to specify which studies will be imported into AMBIT

Where can I find these fields in IUCLID?

- In each **Endpoint study record** the relevant fields are located in
 - Administrative Data
 - Data source
 - Test materials



Administrative Data

EU: REACH

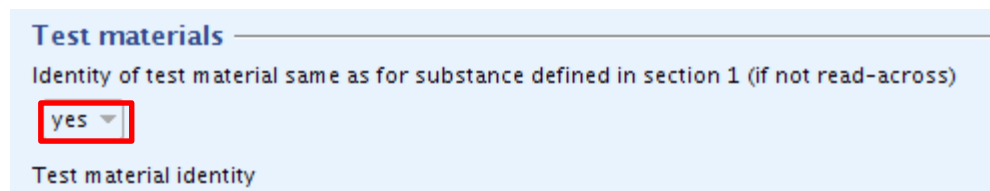
Purpose flag **key study**

Data waiving

Justification for data waiving

Study result type **experimental result**

Reliability **1 (reliable without restriction)**

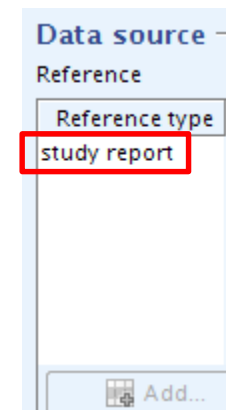


Test materials

Identity of test material same as for substance defined in section 1 (if not read-across)

yes

Test material identity



Data source

Reference

Reference type

study report

Add...

Why a selection is reasonable?

- Only **high quality study records** of the IUCLID substance itself **should** be imported into AMBIT, therefore **we recommend** to select only:
 - **Key studies** and **Supporting studies** (Purpose flag); the flags weight of evidence and disregarded study are not high quality information.
 - Reliability **1** and **2** (Reliability); **3** (not reliable) and **4** (not assignable) are not helpful to characterize the relevant endpoint information.
 - **Experimental result** (Study result type); Read across information should not be selected, because these information will be transferred with the original IUCLID substance to AMBIT.
 - **Study reports**, **Publications** and **Review article** (Reference type); secondary source and grey literature should not be imported
 - Only Endpoint study records marked with **Yes** (Test material) are reasonable; other information (No or Not specified) indicate that the study belongs to a Read across substance.

Import filter in AMBIT

In Ambit some import filters can be selected

Assessments ▾ Import ▾ Enhanced functions ▾ Admin ▾ Help ▾

Retrieve substance(s) from IUCLID5 server

Retrieve substance(s) from IUCLID5 server

Select substance

by UUID ▾

UUID*

Clear existing study records

Clear existing composition records

Import only high quality study records (uncheck to import all records)

Purpose flag + -

- key study
- supporting study
- weight of evidence
- disregarded study
- Not specified

Study result type + -

- experimental result
- experimental study planned
- estimated by calculation
- read-across based on grouping
- read-across from supporting su

Test material + -

- yes
- no
- Not specified

Reliability + -

- 1 (reliable without restriction)
- 2 (reliable with restrictions)
- 3 (not reliable)
- 4 (not assignable)
- other:

Reference type + -

- study report
- other company data
- publication
- review article or handbook
- secondary source

[Select high quality study criteria](#)

+ [Select All](#)

- [Unselect all](#)



Thank you