

Substance identification and naming convention for hydrocarbon solvents

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Substance identification and naming convention for hydrocarbon solvents

Introduction

REACH requires a clear and logical substance description. Substance identification is a key component in pre-registration, SIEF and potential consortia formation, and subsequent registration. In order to facilitate appropriate registration of hydrocarbon solvents, the Hydrocarbon Solvents Producers Association (HSPA) has conducted an in-depth assessment of hydrocarbon solvents in order to better characterize its substances and adopt a consistent substance identification system.

The purpose of this letter is to explain the approach followed by HSPA to describe hydrocarbon solvents under REACH requirements and to provide guidelines on the use of the hydrocarbon solvent naming convention as part of the pre-registration / registration process.

Approach

The European Inventory of Existing Commercial Substances (EINECS) descriptions and numbers have been used historically to identify chemical substances. EINECS descriptions exist for a number of hydrocarbon substances derived from petroleum refining and chemical conversion. However, these descriptions are overly broad to describe hydrocarbon solvent substances as solvents have narrower hydrocarbon ranges, different classifications and different processing.¹ A more focused and narrow definition is therefore required. In attachment to this letter (attachment 1 - page 6), you will find an example highlighting the differences that exist today between the EINECS description and the Hydrocarbon solvents, here for a de-aromatised white spirit.

HSPA more precisely defines hydrocarbon solvents by establishing criteria within the REACH substance identification guidance. As an outcome of this exercise, a common naming system has been developed to identify properly similar substances.

Benefits

This approach provides significant benefits to the registration of hydrocarbon solvents by:

- Facilitating identification of the substances.
- Facilitating identification of sameness of substances and as such facilitating SIEF formations.
- Providing more clarity for authorities, for registrants (other than HSPA members) and for the market

¹ Guidance for identification and naming of substances under REACH and CLP § 4.3.1.2

- Allowing more targeted hazard characterization and risk assessments
- Avoiding misperceptions and misclassifications.

The approach is fully compatible with REACH requirements.

Identification and naming convention

The identification and naming system is based on the following:

- The Guidance for identification and naming of substances under REACH and CLP.
- Products of similar composition (carbon number range and chemical structures) and similar use should be the same substance.
- One hydrocarbon solvent substance = one classification to the extent possible.
- It is in line with the way in which hydrocarbon solvents were identified for purposes of data submission to meet the requirements of the OECD HPV (High Production Volume) initiative (see attachment 4).

Three types of substances have been defined by REACH in the ECHA guidance²:

1) Mono-constituent substances, which consist off more than 80% of one main component.³

They are described by the name of this single main component.

Examples are n-pentane, n-hexane, n-decane, and toluene.

2) Defined multi-constituent substances, in which the main constituents are present in concentrations between 10 and 80%.⁴

The composition must be known and more than one constituent is relevant for the identification of the substance. The chemical composition of the substance is predictable, as typical values and ranges.

These substances will be described as specified in ECHA guidance as a reaction mass of the main constituents of the substance as such.

Example given in the guidance: Xylene, consisting of more than 10% of m-xylene and o-xylene, p-xylene is considered as impurity (<10%), will be described as "Reaction mass of m-xylene and o-xylene".

² Guidance for identification and naming of substances under REACH and CLP § 4

³ Guidance for identification and naming of substances under REACH and CLP § 4.2.1

⁴ Guidance for identification and naming of substances under REACH and CLP § 4.2.2

3) Unknown or Variable composition Complex reaction products or Biological materials (UVCB) substances.⁵

A number of hydrocarbon solvents meet the criteria for UVCB substances as the number of discrete chemical constituents is relatively large and the composition of all discrete chemical components is variable and cannot always be identified.

The convention agreed upon to describe UVCB hydrocarbon solvents is the following:

- a) **"Hydrocarbons" will be the first part of the name** to recognize their specific chemical character.
- b) **The carbon number range** (which must at least include 80% of all the components of the substance) determined by Gas Chromatography (GC) or an equivalent test method.
- c) **The description of the hydrocarbon structures** present or the PINA structure: n-paraffins (or n-alkanes), isoparaffins (or isoalkanes), saturated cyclics (or naphthenes) and aromatics. The first three are mentioned when present in the substance at a level between 10 and 80%. Aromatics will be indicated as per HPV category.
- d) **Components with specific toxicological properties or classifications** will be mentioned, using the classification cut-off as an indication level (according to Annex VI of EU regulation EC/1272/2008 as known as CLP).

Detailed examples can be found under [attachment 2](#) - page 7.

Note:

The HSPA naming description can also be used for solvents belonging to the first two types of substances (mono-constituents and defined multi constituents) in order to determine if they fit into one of the existing HSPA naming categories. If the substance fit within the existing categories, the producer can join the HSPA consortium and benefit from read across for data on the corresponding category.

⁵ Guidance for identification and naming of substances under REACH and CLP § 4.3

Attachment 1

Example of difference in substance identification between EINECS and hydrocarbon solvents naming

An example of the difference in product description and hazard classification for a substance, depending on using the EINECS number or the Hydrocarbons naming convention, is presented.

The chosen product is a typical de-aromatised white spirit, with following composition:

<u>Components</u>	<u>amount</u>
Normal paraffins	25 %
Isoparaffins	25 %
Cycloparaffins	49.6 %
Aromatics	0.4 %

Carbon number	C8	C9	C10	C11	C12	C13
Amount in %	1	10	40	42	6	1

In the ECHA guidance for identification of substances, it is indicated that only the components present in an amount above 10% must be given and that the given substance description must at least include 80% of the determined composition. In this example only normal paraffins, isoparaffins and cycloparaffins with carbon number of C9, C10 and C11 have been provided.

Difference depending on the chosen naming description:

	EINECS number	HSPA naming convention
Substance description	265-150-3 Naphtha (petroleum) Hydrotreated heavy	Hydrocarbons, C9-11 n-alkanes, isoalkanes, cyclics, <2% aromatics
Specified carbon range	C6 - C13	C9 - C11
Specified boiling range	65 - 230 °C	not given, but ± 160 - 190 °C
Aromaticity	Not addressed	Indicated as < 2%
Hazard classification	Hazards could include R11, R20, R45, R46, R48, R63 R38, R65, R66, R67 and/or R51/53 (depending on the presence of various components at varying levels)	R10, R65, R66 (components requiring other classifications are not present in that substance)

Attachment 2

Example of substance naming for hydrocarbon solvents: regular white spirit

A regular white spirit's composition is analyzed by Gas Chromatography (GC) and Mass Spectrophotometry (MS).

GC analysis revealed a total aromatic content of 19% and a benzene content of 0.0001% (1ppm). Also with GC the carbon split was determined as follows:

Carbon number	C8	C9	C10	C11	C12	C13
Amount in %	1	10	40	42	6	1

With MS the non aromatic fraction could be separated into a naphthenic (saturated cycloparafinic) fraction of 33%, a normal paraffin (n-alkanes) fraction of 22% and an isoparaffin (isoalkanes) fraction of 26%.

Naming of the substance

a) Substance nature:

The product is a liquid, used specifically as solvent, with resulting purity restrictions and specific manufacturing processes. The chemical nature of the solvent is clearly hydrocarbon, so the name will start with the generic description "**Hydrocarbons**".

b) Carbon range:

The major components will be indicated by giving the carbon number range. For this we use the rules described in ECHA guidance for identification and naming of substances under REACH and CLP. The components identified by hydrocarbon type and carbon number range must represent at least 80% of the total composition and individual components at levels above 10% must be mentioned. Individual components at level below 10% are not included in the naming of the substance unless they trigger a health or environmental classification.

In this case we do not know all the constituents for each carbon number range, as the C8, C12 and C13 hydrocarbon components represent less than 10% of the total substance and following the ECHA guidance it's not necessary to mention them. The remaining components represent more than 80% of the composition: i.e the sum of C9, C10 & C11 is 92%. Since the composition of each isomer of each of the C9, C10 and C11 hydrocarbons is variable we consider each carbon number range as one component, which must be reflected in the name.

The substance name becomes "Hydrocarbons, **C9-C11**".

c) Component split:

The best we can do with actual analytical methods is to determine the component split by MS into normal n-alkanes, isoalkanes, cyclics and aromatics.

For the component split we again start from the ECHA guidance for identification and naming of substances rules, specifying that each component equal or above 10% must be mentioned and

that at least 80% of the total composition must be covered. We also consider the existing HPV classification, which splits the hydrocarbons in defined groups.

Each of the possible four component groups (see above) is present at more than 10% and must be mentioned in the substance name. So the name must include n-alkanes, isoalkanes, cyclics and aromatics.

Regular white spirit falls within the category of substances identified as "C9-C14 Aliphatics (2-25% aromatics)" and was identified in that way as part of the OECD HPV process. To highlight the relationship with the existing HPV definition, we decided to specify the aromatic range according to this guideline (2-25%).

Substance name is now "Hydrocarbons, C9-C11, **n-alkanes, isoalkanes, cyclics, aromatics (2-25%)**".

d) Components with specific toxicology or classification:

Components which trigger a specific classification or labeling are mentioned if present and if measured above the cut-off limit.

In this case, benzene has been measured because, if benzene is present at a level of or above 0.1%, the substance has to be classified as carcinogenic. As the level of benzene is below this regulatory cut-off point the substance is not classified on the basis of benzene content and there is no need to mention the component in the naming.

Name remains: "Hydrocarbons, C9-C11, n-alkanes/isoalkanes/cyclics/aromatics (2-25%)".

Final name for REACH registration:

Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)

Other Examples:

Technical hexane is: "Hydrocarbons, C6, n-alkanes, isoalkanes, cyclics, n-hexane rich".

Dearomatised white spirit is: "Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, <2% aromatics".

Attachment 3

Attachment 3

Defined substances per REACH registration Dossier

You can find below the list of the hydrocarbon substances REACH registered, grouped by HPV category:

Category 1 : C9 Aromatics		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C9, aromatics	918-668-5	01-2119455851-35-xxxx
Hydrocarbons, C9-C10, aromatics >1% naphthalene	946-365-8	01-2120783819-33-xxxx

Category 2 : C9-12 Aromatics		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C10, aromatics, >1% naphthalene	919-284-0	01-2119463588-24-xxxx
Hydrocarbons, C10, aromatics, <1% naphthalene	918-811-1	01-2119463583-34-xxxx
Hydrocarbons, C10-C13, aromatics, <1% naphthalene	922-153-0	01-2119451097-39-xxxx
Hydrocarbons, C10-C13, aromatics, >1% naphthalene	926-273-4	01-2119451151-53-xxxx

Category 3 : C9-14 Aliphatics (2-25% Aromatics)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C9-C10, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	927-344-2	01-2119463586-28-xxxx
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	919-164-8	01-2119473977-17-xxxx
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	919-446-0	01-2119458049-33-xxxx
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	925-653-7	01-2119458869-15-xxxx
Hydrocarbons, C12-C16, n-alkanes, isoalkanes, cyclics, aromatics (2-25%)	920-008-6	01-2120787012-59-xxxx

Category 4: C14-20 Aliphatics (2-30% aromatic)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C14-C18, n-alkanes, isoalkanes, cyclics, aromatics (2-30 %)	920-360-0	01-2119448343-41-xxxx
Hydrocarbons, C16-C20, n-alkanes, isoalkanes, cyclics, aromatics (2-30 %)	919-006-8	01-2119455996-19-xxxx

Category 5: C5 Aliphatics		
Substance name	EC Number	REACH Registration Number
Normal-Pentane	203-692-4	01-2119459286-30-xxxx
Iso-Pentane (2-methylbutane)	201-142-8	01-2119475602-38-xxxx
Cyclopentane	206-016-6	01-2119463053-47-xxxx
Hydrocarbons, C5, n-alkanes, isoalkanes	921-577-3	01-2119474207-37-xxxx

Category 6: C6 Aliphatics		
Substance name	EC Number	REACH Registration Number
n-Hexane	203-777-6	01-2119480412-44-xxxx
Hydrocarbons, C6, isoalkanes, <5% n-hexane	931-254-9	01-2119484651-34-xxxx
Hydrocarbons, C6, n-alkanes, isoalkanes, cyclics, n-hexane rich	925-292-5	01-2119474209-33-xxxx
Hydrocarbons, C5-C7, n-alkanes, isoalkanes, <5% n-hexane	922-114-8	01-2119984314-33-xxxx
Hydrocarbons, C6-C7, isoalkanes, cyclics, <5% n-hexane	926-605-8	01-2119486291-36-xxxx
Hydrocarbons, C5-C7, n-alkanes, isoalkanes, n-hexane rich	930-397-4	01-2119497828-14-xxxx
2-Methyl-pentane	639-864-4	01-2119987103-37-xxxx
2,2 Diméthyl-butane	200-906-8	01-2120807799-38-xxxx
2,3 Diméthyl-butane	201-193-6	01-2120807800-63-xxxx

CATEGORY 7: C7-9 Aliphatics		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C7, n-alkanes, isoalkanes, cyclics	927-510-4	01-2119475515-33-xxxx
Hydrocarbons, C6-C7, n-alkanes, isoalkanes, cyclics, >5% n-hexane	924-168-8	01-2119472127-39-xxxx
Hydrocarbons, C6-C7, n-alkanes, isoalkanes, cyclics, <5% n-hexane	921-024-6	01-2119475514-35-xxxx
Hydrocarbons, C7-C8, n-alkanes	922-214-1	01-2120087944-41-xxxx
Hydrocarbons, C7-C9, n-alkanes, isoalkanes, cyclics	920-750-0	01-2119473851-33-xxxx
Hydrocarbons, C6-C10, n-alkanes, isoalkanes, >5% n-hexane	920-191-2	01-2119493387-24-xxxx
Hydrocarbons, C7-C8, isoalkanes, <2% aromatics	947-588-3	01-2120769768-30-xxxx
Hydrocarbons, C7-C9, isoalkanes	921-728-3	01-2119471305-42-xxxx
Hydrocarbons, C8-C9, isoalkanes	932-020-9	01-2119548395-31-xxxx
Hydrocarbons, C7-C8, cyclics	927-033-1	01-2119486992-20-xxxx
Normal-Heptane	205-563-8	01-2119457603-38-xxxx
Iso-Heptane	250-610-8	01-2119457601-42-xxxx
2,2,3 Triméthyl-butane	207-346-3	
Normal-Octane	203-892-1	01-2119463939-19-xxxx
Iso-Octane (2,2,4-triméthylpentane)	208-759-1	01-2119457965-22-xxxx
Isooctane (UVCB)	247-861-0	01-2120773304-56-xxxx
Nonane	203-913-4	01-2119447107-42-xxxx

CATEGORY 8: C9-14 Aliphatics (<=2% aromatic)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C9-C11, n-alkanes, isoalkanes, cyclics, <2% aromatics	919-857-5	01-2119463258-33-xxxx
Hydrocarbons, C9-C10, n-alkanes, isoalkanes, cyclics, <2% aromatics	927-241-2	01-2119471843-32-xxxx
Hydrocarbons, C9-C11, isoalkanes, cyclics, <2% aromatics	920-134-1	01-2119480153-44-xxxx
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, cyclics, <2% aromatics	918-481-9	01-2119457273-39-xxxx

CATEGORY 8: C9-14 Aliphatics (<=2% aromatic)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C10-C13, isoalkanes, cyclics, <2% aromatics	918-317-6	01-2119474196-32-xxxx
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, cyclics, <2% aromatics	926-141-6	01-2119456620-43-xxxx
Hydrocarbons, C13-C15, n-alkanes, isoalkanes, cyclics, <2% aromatics	917-488-4	01-2119458943-27-xxxx
Hydrocarbons, C12-C15, n-alkanes, isoalkanes, cyclics, <2% aromatics	920-107-4	01-2119453414-43-xxxx
Hydrocarbons, C11-C14, isoalkanes, cyclics, <2% aromatics	927-285-2	01-2119480162-45-xxxx
Hydrocarbons, C10-C12, isoalkanes, <2% aromatics	923-037-2	01-2119471991-29-xxxx
Hydrocarbons, C11-C12, isoalkanes, <2% aromatics	918-167-1	01-2119472146-39-xxxx
Hydrocarbons, C11-C13, isoalkanes, <2% aromatics	920-901-0	01-2119456810-40-xxxx
Hydrocarbons, C10-C13, n-alkanes, <2% aromatics	929-018-5	01-2119475608-26-xxxx
Hydrocarbons, C11-C14, n-alkanes, <2% aromatics	924-803-9	01-2119485647-22-xxxx
Hydrocarbons, C13-C14, n-alkanes, <2% aromatics	939-519-0	01-2119972340-42-xxxx
Hydrocarbons, C10-C12, n-alkanes, <2% aromatics	926-527-4	01-2120770308-51-xxxx
Hydrocarbons, C9-C11, cyclics, <2% aromatics	925-894-8	01-2119472436-34-xxxx
Decane	204-686-4	01-2119474199-26-xxxx
Undecane	214-300-6	01-2119486569-17-xxxx
Dodecane	203-967-9	01-2119486573-28-xxxx
Tridecane	211-093-4	01-2119487446-26-xxxx
Tetradecane	211-096-0	01-2119485515-31-xxxx
Isododecane (2,2,4,6,6-pentamethylheptane)	236-757-0	01-2119490725-29-xxxx
Hydrocarbons, C4, 1,3-butadiene-free polyimd, triisobutylene fraction, hydrogenated	297-629-8	01-2120752626-49-xxxx
Hydrocarbons, C10-C14 (even numbered), n-alkanes, isoalkanes, <2% aromatics	920-274-3	01-2119458951-30-xxxx
Hydrocarbons, C12-C16, isoalkanes, cyclics, < 2% aromatics	927-676-8	01-2119456377-30-xxxx
Hydrocarbons, C8-C11, n-alkanes, isoalkanes, <2% aromatics	940-733-1	01-2120042086-64-xxxx

CATEGORY 8: C9-14 Aliphatics (<=2% aromatic)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C9-C11, n-alkanes, isoalkanes, <2% aromatics	941-718-2	01-2120083589-39-xxxx
Hydrocarbons, C9-C12, n-alkanes, isoalkanes, <2% aromatics	940-725-8	01-2120041197-60-xxxx
Hydrocarbons, C10-C13, n-alkanes, isoalkanes, <2% aromatics	940-726-3	01-2120042087-62-xxxx
Hydrocarbons, C11-C13 (odd number), n-alkanes, <2% aromatics	942-924-5	01-2120101110-89-xxxx
Hydrocarbons, C11-C14, n-alkanes, isoalkanes, <2% aromatics	701-280-3	01-2119458951-30-xxxx
Hydrocarbons, C11-C16, n-alkanes, isoalkanes, <2% aromatics	942-085-5	01-2120085325-55-xxxx
Hydrocarbons, C12-C15, n-alkanes, isoalkanes, <2% aromatics	940-727-9	01-2120042085-66-xxxx
Alkanes, C12-14 iso-	271-369-5	01-2119491311-45-xxxx

Category 9: C14-20 Aliphatics (<=2% aromatic)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C13-C18, n-alkanes, isoalkanes, cyclics, <2% aromatics	928-253-0	01-2119496246-29-xxxx
Hydrocarbons, C14-C18, n-alkanes, isoalkanes, cyclics, <2% aromatics	927-632-8	01-2119457736-27-xxxx
Hydrocarbons, C16-C20, n-alkanes, isoalkanes, cyclics, <2% aromatics	919-029-3	01-2119457735-29-xxxx
Hydrocarbons, C13-C16, isoalkanes, cyclics, <2% aromatics	918-973-3	01-2119458871-30-xxxx
Hydrocarbons, C14-C19, isoalkanes, cyclics, <2% aromatics	920-114-2	01-2119459347-30-xxxx
Hydrocarbons, C14-C17, n-alkanes, <2% aromatics	917-828-1	01-2119487513-33-xxxx
Hydrocarbons, C14-C20, n-alkanes, <2% aromatics	923-583-1	01-2119485174-35-xxxx
Pentadecane	211-098-1	01-2119977102-41-xxxx
Hexadecane	208-878-9	01-2119936836-25-xxxx
Isohexadecane (2,2,4,4,6,8,8 heptamethylnonane)	224-506-8	01-2119486102-45-xxxx
Octadecane	209-790-3	01-2119936912-33-xxxx
Icosane	204-018-1	01-2119938337-31-xxxx
Isoeicosane (Hydrocarbons, C4, 1,3-butadiene-free, polymd., pentaisobutylene fraction, hydrogenated)	297-627-7	01-2119987314-30-xxxx

Category 9: C14-20 Aliphatics (<=2% aromatic)		
Substance name	EC Number	REACH Registration Number
Hydrocarbons, C14-C16, n-alkanes, isoalkanes, <2% aromatics	940-728-4	01-2120081656-48-xxxx
Hydrocarbons, C14-C17, isoalkanes, cyclics, <2% aromatics	939-601-6	01-2119977122-39-xxxx
Hydrocarbons, C17-C19, n-alkanes, <2%aromatics	937-158-3	01-2119897949-04-xxxx
Hydrocarbons, C14-C15, n-alkanes, <2% aromatics	928-868-4	01-2119977112-40-xxxx
Hydrocarbons, C15-C19, n-alkanes, isoalkanes, <2% aromatics	940-730-5	01-2120042084-68-xxxx
Hydrocarbons, C16-C18, Isoalkanes, <2% aromatics	948-766-3	01-2120789575-35-xxxx
Hydrocarbons, C13-C16, Isoalkanes, <2% aromatics	946-885-5	01-2120768767-33-xxxx

Attachment 4

Substances identified but not falling in one of the predefined HPV categories

Hydrocarbons, C10-C17, n-alkanes, isoalkanes, cyclics, aromatics (10-25 %)

Note: Check if 80% of composition fits into C9-14 or C14-20.

*If not read across may be possible with category C9-14 Aliphatics (2-25% aromatics)
or C14-20 Aliphatics (2-30% aromatics)*

Hydrocarbons, C12-C16, n-alkanes, isoalkanes, cyclics, <2% aromatics

Hydrocarbons, C12-C16, isoalkanes, cyclics, <2% aromatics

*Note: Check if 80% composition fits into C9-13 Aliphatics ($\leq 2\%$ aromatics) or
C14-20 Aliphatics ($\leq 2\%$ aromatics)*

If not read across may be possible with one of these two categories.

Hydrocarbons, C13-C20, n-alkanes, isoalkanes, cyclics, aromatics (40-60 %)

Note: Read across may be possible with category C14-20 Aliphatics (2-30% aromatics)