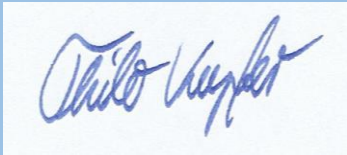
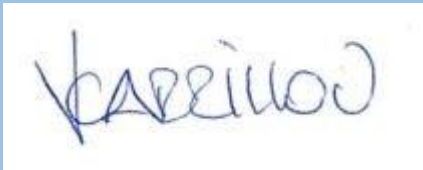


# LCI Review report (reviewed against "ILCD Data Network - entry-level requirements")

## C16-18 TEA-Quat (oleo based) (No. 24 - Matrix)

Table 1: General review reporting items

REVIEW REPORTING	
<b>General information</b>	
Data set name	C16-18 TEA-Quat (oleo based) (No. 24 - Matrix, ELCD)
Data set UUID and version number	{376BD9A6-9221-4759-8E82-0910BC73B1DE} V1.0
Data set locator (e.g. Permanent URI, URL, contact point, or database name and version, etc.)	ERASM ( <a href="http://www.erasm.org">www.erasm.org</a> ) Data sets will be made available via <a href="http://eplca.jrc.ec.europa.eu/ELCD3">http://eplca.jrc.ec.europa.eu/ELCD3</a> Based on GaBi 7, DB version 6.115, SP 29
Data set owner	ERASM: Environmental & Health Risk Assessment and Management of Surfactants, a research partnership of the European Detergents and Surfactants Industries: A.I.S.E., the International Association for Soaps, Detergents and Maintenance Products, and CESIO, the European Committee of Organic Surfactants and their Intermediates ( <a href="http://www.erasm.org">www.erasm.org</a> )
Review commissioner(s)	ERASM
Reviewer name(s) and affiliation(s), contact	Dr. Thilo Kupfer and Viviana Carillo, thinkstep AG, Hauptstr. 111-113, 70771 Leinfelden-Echterdingen
Review type applied	Data set review against ILCD Data Network - Entry-level requirements
Date of review completion (DD/MM/YYYY)	21/04/2016
Reviewed against / Compliance system name	ILCD Data Network - Entry-level requirements

Reviewer assessment:			
Aspect	Yes	No	Comments
Quality compliance (aspects of ISO 14040 & 14044) fulfilled (see table 2)	x		See table 2
Method compliance (as in ISO 14040 & 14044) fulfilled and documented in data set	x		See table 2
Nomenclature compliance (see table 3) fulfilled	x		See table 3
Documentation compliance (see table 3) fulfilled	x		See table 3
Review compliance (Independent external review OR independent internal review + review report) fulfilled	x		Independent internal review + review report
Overall compliance with ISO 14040 & 14044	x		Data set reviewed by two independent experts against ISO 14040 & ISO 14044
Overall compliance with "Compliance system"	x		Relates to ILCD Data Network - Entry-level requirements
Date, location, reviewer signature	21/04/2016, Leinfelden-Echterdingen  Dr. Thilo Kupfer  Viviana Carrillo		

**Table 2: Specific/detailed review reporting items for LCI data set: Quality compliance (ISO 14040 & 14044). Please note that for aggregated LCI result data sets, this includes key processes in the background system.**

ITEMs	Comments
<p>Time-related coverage/representativeness:</p> <p>“age of data and the minimum length of time over which data should be collected”</p> <p>“qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Very good.</p> <p>Reference year: 2011</p> <p>Production data was collected as annual average of the production year 2011.</p> <p>The data set is representative for the state of technology in 2011 and considered to be valid for ten (10) years or until substantial technological changes in the production chain occur.</p>
<p>Geographical coverage/representativeness:</p> <p>“geographical area from which data for unit processes should be collected to satisfy the goal of the study”</p> <p>“qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Very good.</p> <p>Primary production data for TEA-Quat production is from four different suppliers in Europe in three different countries (France, Germany and Spain).</p>
<p>Technology coverage/representativeness:</p> <p>“specific technology or technology mix”</p> <p>“qualitative assessment of the degree to which the data set reflects the true population of interest”</p>	<p>Good.</p> <p>Foreground system: Quaternized triethanolamine fatty acid esters are obtained by reacting triethanolamine with C16-18 alcohols, C16-18 alcohol esters or oils and subsequent quaternization of the resulting triethanolamine fatty acid esters. The fatty acid used is tallow fatty acid. Dimethyl sulphate (DMS) is the quaternizing agent. To the esteramine, isopropanol is added as a solvent to lower the viscosity of the reaction mixture. The quaternization is carried out by slowly adding dimethyl sulphate in several portions at temperatures between 40 and 60°C. A slightly under-stoichiometric amount of dimethyl sulphate is used to ensure that all of the toxic dimethyl sulphate can react with esteramine, and thus avoiding traces of dimethyl sulphate in the final product. [ZOLLER 2009] The product is a mixture of quaternized mono-, di- and tri-esters of triethanolamine and unconverted triethanolamine, which corresponds to the so called quaternized triethanolamine di-(tallow/C16-18)fatty acid ester.</p>
<p>Precision/ Uncertainty of the information (e.g. data, models and assumptions):</p> <p>“measure of the variability of the</p>	<p>Good.</p> <p>Based on various precision and uncertainty checks the likelihood of systematic errors in the dataset is low.</p>

ITEMs	Comments
data values for each data expressed (e.g. variance)”	<ul style="list-style-type: none"> <li>- Check for plausibility of data sampling</li> <li>- Check of mass and energy balances</li> <li>- Cross-checks with other data sources and available data sets (LCIs)</li> </ul>
<p>Completeness:</p> <p>“percentage of flow that is measured or estimated”; assessed on level of process</p>	<p>Good.</p> <p>Cut-off rules for each unit process: Coverage of at least 95% of mass and energy of the input and output flows, and 98% of their environmental relevance (according to expert judgment).</p> <p>Excluded from the analysis are:</p> <ul style="list-style-type: none"> <li>- The construction of major capital equipment (infrastructure)</li> <li>- Maintenance and operation of sup-port equipment</li> <li>- Human labor and employee transport and</li> <li>- Packaging of final products</li> </ul> <p>In addition, all 15 LCIA methods recommended by the Product Environmental Footprint (PEF Guide 4.0) can be evaluated.</p>
<p>Consistency:</p> <p>“qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis”</p>	<p>Very Good</p> <p>Foreground and background model are compliant with GaBi modelling principles and ISO 14040/14044, hence a consistent modelling approach is applied.</p>
<p>Sources of the data; Appropriateness of use primary/secondary data source</p>	<p>ERASM Surfactant Life Cycle and Ecofootprinting (SLE) Project GaBi databases</p> <p>The data set covers all relevant process steps / technologies over the supply chain of the represented cradle to gate inventory with a very good overall data quality. It represents a production average based on the year 2011. The inventory is mainly based on industry data and is completed, where necessary, by secondary data. This data set is based on primary data from European adopted production processes, connected with regional precursor chains. The data set is based on primary production data for quaternized triethanolamine production is from four different suppliers, either France, Germany or Spain, representing the imported and produced quaternized triethanolamine in Europe. Transportation was just considered for the main materials (covers about 90% of the mass of all inputs), other transportation was not considered.</p>
<p>Overall data quality rating according to PEF evaluation scheme.</p>	<p>Very good.</p> <p>Overall quality according to PEF validation scheme results in 1,6 interpreted into "very good overall quality" in the PEF quality validation scheme.</p>
<p>Others</p>	<p>None.</p>

**Table 3: Specific/detailed review reporting items for LCI data set: Nomenclature and Documentation**

ITEMs	Comments
<b>Nomenclature</b>	
Correctness and consistency of applied nomenclature (Preferred use of ILCD flows etc.; Correct nomenclature of other flows; Exclusion of not permissible waste flows, sum indicator elementary flows etc.)	<p>Nomenclature of elementary flows is correct according to the flow check tool 1.2.1; no issues detected</p> <p>Elementary flows are compliant to ILCD nomenclature</p> <p>Product flows / correctness of product flows not verifiable as not standardized,</p> <p>Except of four (4) radioactive waste flows, all waste flows are modelled to the end of waste status</p> <p>Unspecific elementary flows are not used (e.g. VOC (air emission), heavy metals (unspecific emissions in water))</p>
<b>Documentation</b>	
Appropriateness of documentation (see Document "Documentation of LCA data sets")	<p>Documentation check tool applied, no issues detected.</p> <p>All mandatory and some optional documentation fields do contain supportive meta data about the setup of the LCI data set.</p>
Appropriateness / correctness of documentation form (ILCD Format)	Documentation of the dataset uses ILCD format provided by GaBi LCA software export