1st Stakeholder Consultation – Compilation of initial substance information for Medium chain chlorinated paraffins (MCCPs) - Alkanes, C14-17, chloro (CAS 85535-85-9; EC 287-477)

Abbreviations

CLP	Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging
CoRAP	Community Rolling Action Plan
ECHA	European Chemical Agency
EEE	Electric and Electronic Equipment
LCCPs	Long Chain Chlorinated Paraffins
KEMI	Swedish Chemicals Agency
MCCPs	Medium Chain Chlorinated Paraffins
SCCPs	Short Chain Chlorinated Paraffins
PBT	Persistent, Boaccumulative and Toxic substance
PVC	Poly Vinyl Chloride
UVCB	Chemical Substances of Unknown or Variable Composition, Complex Reaction Products and Biological Materials

1. Legal status and other restrictions

MCCPs are classified under the CLP regulation (Regulation (EC) No 1272/2008 on Classification, Labelling and Packaging) as follows[1]:

- Lact. (Reproductive toxicity, Effects on or via lactation) - H362- (May cause harm to breast-fed children)
- Aquatic Acute 1 (Hazardous to the aquatic environment) - H400 (Very toxic to aquatic life)
- Aquatic Chronic 1(Hazardous to the aquatic environment) - H410 (Very toxic to aquatic life with long lasting effects)

MCCPs are on the Community Rolling Action Plan (CoRAP) as a suspected PBT, also fulfilling the concerns of (environmental) exposure relevant for wide dispersive use and high aggregated tonnage.[2] The UK evaluated MCCPs and acquired details on the exact composition of different MCCP products, performing further tests to verify the PBT status of different formulations, and collecting more information on exposure routes. On 25 February 2014, ECHA decided that further information on the relevant compositions of MCCP types is necessary as there are different commercial MCCP types:[3] MCCPs are considered to be UVCB substances. A UVCB is defined as a substance of unknown or

[1] https://echa.europa.eu/de/information-on-chemicals/annex-vi-to-clp, last viewed 19.04.2018

[2] http://www.echa.europa.eu/web/guest/information-on-chemicals/evaluation/community-rolling-action-plan/corap-table?search_criteria=85535-85-9, last viewed 19.04.2018

[3] ECHA (2014): Decision on Substance Evaluation Pursuant to Article 46(1) of Regulation (EC) No 1907/2006 for alkanes , C14-17, chloro (MCCP, Medium-chain chlorinated paraffins); CAS No 85535-85-9 (EC No 287-477-0); case no. A-004-2014; https://echa.europa.eu/about-us/who-we-are/board-of-appeal/decisions, last viewed 19.04.2018

variable composition, **c**omplex reaction products or **b**iological materials. MCCPs are linear chloroalkanes, predominantly in the range of C14-17, and with chlorination levels generally in the range of 40-70% by weight. MCCPs may also contain Short Chain Chlorinated Paraffins (SCCPs, carbon chain lengths between 10 and 13) or Long Chain Chlorinated Paraffins (LCCPs, chain length of 18 or more carbons) in their composition. SCCPs are restricted as a substance group by the Stockholm Convention. Against this background, the evaluation process of MCCPs by the UK is still in progress.

Registrants of MCCPs tried to appeal the ECHA decision, which would require further tests to be performed in relation to the properties of MCCPS (bioaccumulation, water solubility, etc.) and was considered by registrants to be burdensome. The appeal was dismissed by the Board of Appeal with a final decision in September 2015.[4]

A study was prepared for the Swedish Chemicals Agency KEMI (2017)[5] concerning a possible restriction of MCCPs in electrical and electronic equipment regulated under RoHS. In relation to the legal status of MCCPs the study concluded that "*MCCP use is not explicitly restricted at Community level. Specific focus on MCCPs has been given under the Helsinki Convention but, in the main, the focus of the regulators has, so far, been on SCCPs, which have PBT properties and are also suspected carcinogens. Importantly, commercial MCCP products may contain SCCPs (as also confirmed by recent research in China (Yin, 2016)) and SCCPs are in May 2017 to be considered for global phase-out following their listing in the Stockholm Convention. Finally, some measures relating to MCCPs at national level (Germany, Norway) are currently in place.*"

2. Uses and quantities

In 2014, INEOS ChlorVinyls, the largest producer of MCCPs in the EU, estimated the total EU market for MCCPs at about 40,000 tonnes and summarized the main applications and amounts in 2014 as follows:[6]

- Adhesives and sealants ca. 1,000 tonnes;
- Lubricants and metal working fluids, including mineral oils ca. 3,000 tonnes;
- Paints ca. 1,000 tonnes;
- Polyurethane foam ca. 8,000 tonnes;
- Flame retardant in rubber ca.1,000 tonnes; and
- Plasticiser/flame retardant in PVC formulations ca. 25,000 tonnes.

As for the uses of MCCPs in EEE, the following applications can be summarized:

[4] Decisions of the Board of appeal to case no. A-004-2014 at https://echa.europa.eu/de/about-us/who-we-are/board-of-appeal/decisions/-/search-decisions/22/search/true; final decision of the Board of Appeal (2015) at https://echa.europa.eu/documents/10162/bcc34f8d-ce53-48cd-9f17-605ad512853a, last viewed 19.04.2018

[5] Swedish Chemicals Agency KEMI (2017): Study of a possible restriction of MCCP in electrical and electronic equipment regulated under RoHS, PM 2/17, May 2017; https://www.kemi.se/global/pm/2017/pm-2-17-study-of-a-possible-restriction-of-mccp-in-electrical-and-electronic-equipment-regulated-under-rohs.pdf, last views 19.04.2018

[6] INEOS ChlorVinyls (2014): Contribution submitted 24.03.2014 during stakeholder consultation; http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Substance_Review/Substance_Profiles/20140324_INEOS_Contribution_RoHS_SC_Substance_Review_MCCP.pdf, last viewed 19.04.2018

- As plasticizer, in a wide range of especially flexible PVC applications, used for EEE cable and wire sheathing and insulation. Typical content of MCCPs in PVC wires and cables is 10-15%, but in some cases it can be up to 20% (EU RAR 2008).[7] About 15,000 tonnes are used in PVC cable formulations according to INEOS ChlorVinyls (2014).
- As plasticizer with flame retardant properties in rubber insulation and sheathing for cables and wires - MCCP content in rubbers has been found to be lower than in flexible PVC applications, with cases reported of 2.6% and 3.8% content (EU RAR 2008), although there was one reported case of 11% in rubber cables in Norway (KEMI 2017).
- As plasticizer with flame retardant properties in adhesives and sealants in non-foam polyurethane (to protect, seal and insulate fragile, pressure-sensitive, microelectronic components and printed circuit boards), foam polyurethane, polysulphide (potting material), acrylic (pressure sensitive adhesives) and butyl rubber (condenser packing for electrical appliances).
- As plasticizer in paints and varnishes used on EEE in chlorinated rubber or copolymer paints less frequently in resin-based paints.

Comparing the data of the EU RAR (2008) and the amounts given by INEOS ChlorVinyls (2014), the data indicates a decrease in the total EU market share of MCCPs: In 2006, approximately 64,000 tonnes of MCCPs were used in total in the EU 25 and around 34,676 tonnes thereof were used in PVC. In 2014, the total amount of MCCPs was indicated at about 40,000 tonnes. The MCCP amount used for PVC cable formulations was estimated to account for about 15,000 tonnes.

KEMI (2017) states that "*from one hand, there are indications on a declining use of PVC compounds in European cable manufacturing and a general trend towards a lower consumption of MCCPs in the EU. On the other hand, significant volumes of finished EEE are imported into the EU28 and these may contain MCCPs.*"

Against this background the question remains if this trend is to be understood as a shift away from MCCPs (i.e. through a decrease in PVC cable use) or if only the manufacture of MCCP based PVC is being shifted from EU manufacturers to non-EU manufacturers (i.e. parts are imported to replace the decrease in manufacture).

Assuming that imports and exports of MCCPs in PVC and/or EEE are largely equivalent, KEMI (2017) used the amount of 15,000 tonnes per year for calculating emissions and assessing the risks to human health and the environment in the 2017 assessment, but noted that the amount might be underestimated.

3. Substitution

The Swedish Chemicals Agency KEMI (2017) extensively reviewed the availability of alternative substances and alternative materials. KEMI (2017) concluded that it is unlikely that one single substance can substitute the MCCPs across all its uses since MCCPs function as both, plasticiser and flame retardant:

[7] EU RAR (2008): Risk Assessment of Alkanes, C14-17, Chloro (Medium-Chained Chlorinated Paraffins), Draft of February 2008; https://echa.europa.eu/documents/10162/13630/trd_rar_uk_mccp_en.pdf/b879f97d-9cea-49e1-9a84-4b3c6a4eb447, last viewed 19.04.2018

“Alternatives such as LCCPs and plasticisers are commercially available (albeit in variable quantities), but there is an absence of evidence to support the suggestion that any single substance identified can substitute MCCPs across its uses in PVC cables. DINP and DIDP, for example, are PVC plasticisers that exhibit technical advantages compared to MCCPs (and have long been used as such), but they lack the combined plasticising and flame retarding effects of MCCPs and they are more costly.

With regard to alternative materials, it would appear that wires and cables containing MCCPs may be replaced by other polymers/flame retardant systems (incorporating halogen-free flame retardants or low-smoke free-of halogen polymer compounds) which can be used in a variety of ways.

Overall, it is clear that the use of alternatives is likely to be associated with more specific, product-by-product reformulations, tailor-made in order to ensure optimised results for end products.

One of the most pertinent issues in terms of substitution would appear to be that of cost, given the low price of MCCPs compared to the majority of potential alternatives.

Finally, whilst several potential alternatives with a more benign hazard profile can be identified, it should also be noted that some alternatives (such as antimony trioxide and trixylyl phosphate) have unfavourable (human health) hazard profiles, which would render them unsuitable as alternatives to MCCPs. LCCPs, the alternative most structurally similar to MCCPs, may appear to be less hazardous than MCCPs but still raise concerns over their environmental hazard profile (PBT properties).”