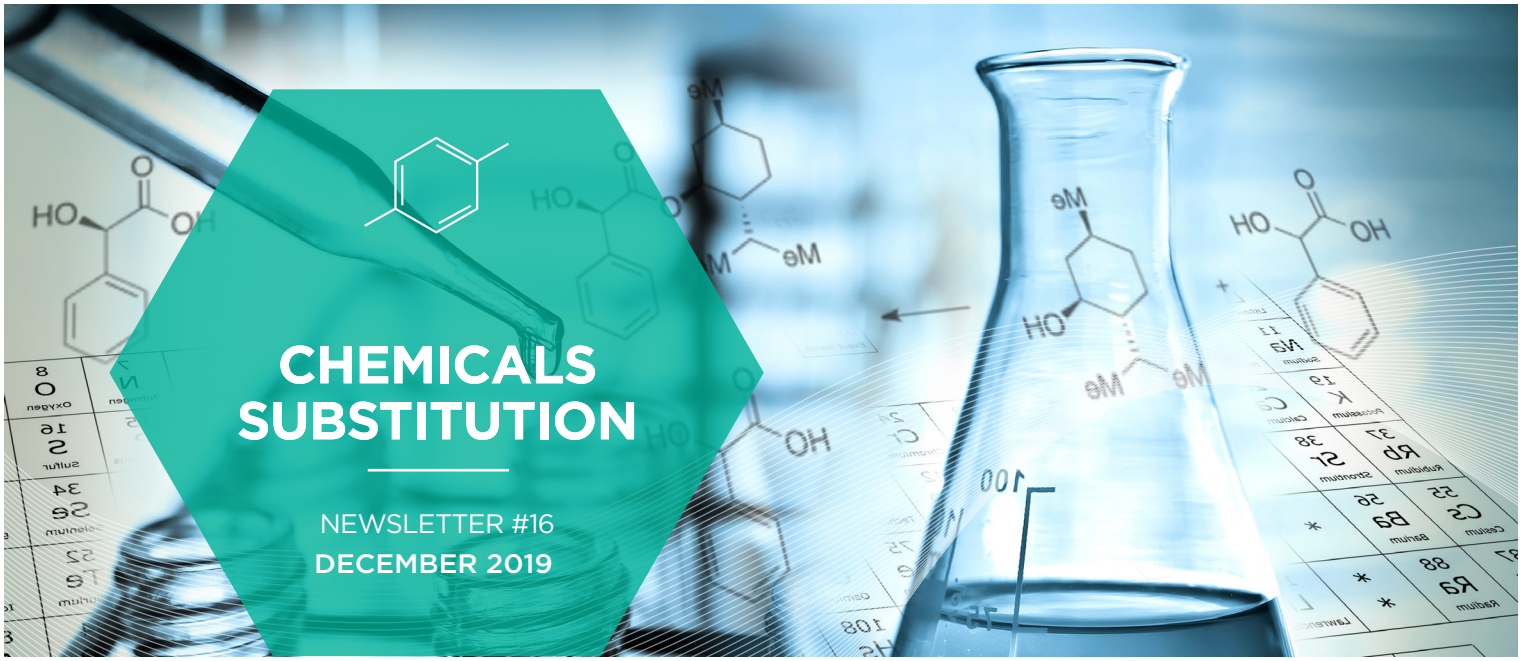

CHEMICALS SUBSTITUTION

NEWSLETTER #16

DECEMBER 2019

WORKSHOP "THE SUBSTITUTION OF CHEMICALS IN THE TEXTILE SECTOR", IN LA DÉFENSE (FRANCE) ON JANUARY 9

This workshop, organized by Ineris in collaboration with the Ministry of Ecological and Solidarity Transition, aims to bring together actors from the textile sector, as well as civil society stakeholders, in order to promote exchanges on the challenges, obstacles and drivers of chemical substitution in this sector. It will also be an opportunity to communicate on the needs and availability of alternatives, and to report on the industrial implementation of alternative solutions.The programme will be communicated soon.

For more information: https://www.ineris.fr/fr/ineris/actualites/enjeux-substitution-filiere-textile (in French)

IDENTIFICATION OF TNPP CONTAINING MORE THAN 0.1% M/M OF BRANCHED AND LINEAR 4-NONYLPHENOL (4-NP) AS SUBSTANCE OF VERY HIGH CONCERN (SVHC)

The ECHA Member States Committee adopted on 16 July 2019 the proposal to classify tris(4-nonylphenyl, branched and linear) phosphite (TNPP) containig more than 0.1% m/m of branched and linear 4-nonylphenol (4-NP) as a substance of very high concern (SVHC).

This decision is based on the identification of the group of 4-nonylphenol substances, branched and linear as SVHC for their endocrine disrupters for the environment properties.

This classification could eventually lead to the addition of TNPP containing more than 0.1% m/m of branched and linear 4-nonylphenol to the list of substances subject to authorisation (Annex XIV of REACH), which already includes branched and linear 4-nonylphenol.

The incomplete synthesis reaction of TNPP with the reagent 4-nonylphenol, branched and linear, explains its presence in the final product as an impurity (its mass concentration being less than 5%).

The exact composition of TNPP depends on the composition of the mixture of 4-nonylphenol isomers used for synthesis (branched and/or linear), therefore no specific CAS number is assigned to the TNPP included in the SVHC list. For example, here are some TNPP CAS numbers: 3050-88-2 and 31631-13-7, 106599-06-8.

TNPP is mainly used as a stabilizer and antioxidant for the treatment of various polymers: LLDPE[1], HDPE[2], rubbers and PVC, other uses are considered to be negligible (stabilizer for nylons, polyacrylics, polycarbonates, polyurethanes, polystyrenes, ABS,

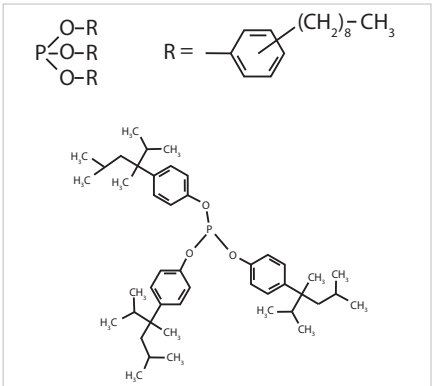

Figure 1/ Chemical structure of TNPP

and terephthalate). The resulting applications are varied: paints and coatings, adhesives, building materials, paper and cardboard products, electronic equipment, consumer items (furniture, toys, curtains, shoes, leather goods...).

Two strategies are available to TNPP users: use TNPP containing less than 0.1% (m/m) of 4-NP or use another antioxidant/stabilizer.

/ Dover Chemical Corp. offers Doverphos HIPURE 4 and Doverphos HIPURE 4 HR, two TNPPs containing less than 0.1% residual 4-NP. According to Dover Chemical Corp, their effectiveness is enhanced by the addition of other stabilizers such as sterically hindered phenol antioxidants.

[1] Linear Low-Density PolyEthylene
[2] Hig Density PolyEthylene

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/ There are antioxidants/stabilisers of the «phosphite» type on the market, which have the advantage of being totally free of nonylphenols and able to replace TNPP. For example, ADDIVANT has launched WESTON® 705 additive. According to this company, the use of this additive, approved for a wide range of materials that meet food contact requirements (HDPE, LLDPE, SBR, NBR, SBC, SBS, ABS and PVC), does not require any process modification. Similarly, Dover Chemical Corp has developed a phosphite antioxidant/stabilizer, free of alkylphenols: Doverphos LGP-11 compatible with polymers (such as LLDPE, HDPE, PP...) for various applications (including food contact applications).

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Dover Chemical Corp Contacts:
Matt Fender mfender@doverchem.com
and Mick Jakupca mjakupca@doverchem.com

Sources:

https://echa.europa.eu/documents/10162/40198e13-d1da-0488-0b89-d350e8a6a75e

https://echa.europa.eu/documents/10162/ceb2fc2c-78f2-627f-29ae-b37c0e91bc69

PEVALEN PRO: PERSTORP MAKES EVOLVING THE SYNTHESIS OF PEVALEN

Pevalen was presented in Newsletter No. 10 and in the news of 11/01/19 as a possible substitute for DEHP and DINP phthalates for applications in direct contact with humans (toys and childcare products, clothing and accessories, sports and leisure products, parts for car interiors, furniture, floors or wall coverings, etc.).

The synthesis of the pentaerythritol tetravalerate[3] molecule is evolving: until now it did not include biosourced reagents, but the Swedish group Perstorp announced the launch of Pevalen Pro, with for innovative the use of pentaerythritol from bioacetaldehyde and biomethanol.

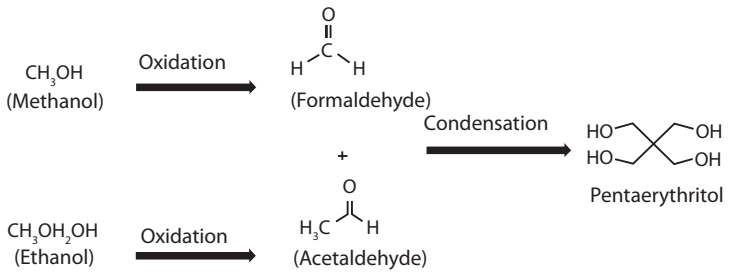


Figure 2/ Synthesis of pentaerythritol

[3] PETV CAS=15834-04-5

Sources:

https://www.perstorp.com/en/products/pevalen

https://scholarly.cmich.edu/?a=d&d=CMUGR2018-098.1.30

https://certificates.iscc-system.org/cert-pdf/ISCC-PLUS-Cert-67332018.pdf

A REINFORCED POLYCARBONATE BASED ON ISOSORBIDE AND CELLULOSE

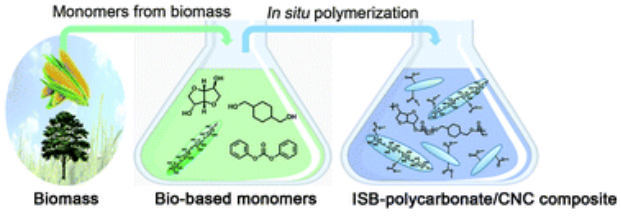
Researchers at the Korea Research Institute of Chemical Technology have developed an alternative to bisphenol A-based reinforced polycarbonate, where the two isosorbide and 1,4-cyclohexanedimethanol monomers and cellulose nanocrystals replace respectively BPA and glass fibers.

Produced from glucose, isosorbide is a dialcohol that can be used as a monomer in polymer synthesis (epoxy resins...). Cellulose nanocrystals are obtained by chemical treatment of cellulose (of plant origin), their structure provides them rigidity and tensile strength, so they can be used as reinforcements in polymer materials.

The synthesis of this material consists of an in situ polymerization of pre-dispersed isosorbide with cellulose nanocrystals.

This polycarbonate enable to stop using BPA, but also glass fibers, which can be harmful to workers' health and produce fine particles likely to cause lung disease in the event of fire, incineration or works.
According to the researchers who developed it, this material has several technical advantages over polycarbonate based on BPA reinforced with glass fibers:

/ More transparency
/ A better tensile strength
/ Greater strength
/ Excellent dispersibility of nano-composite



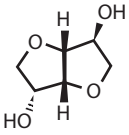


Figure 3/ Structure chimique de l'Isosorbide

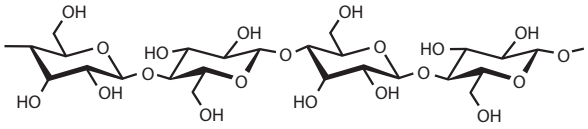


Figure 4/ Structure chimique de la cellulose

Sources:

Seul-A Park, Youngho Eom, Hyeonyeol Jeon, Jun Mo Koo, Eun Seong Lee, Jonggeon Jegal, Sung Yeon Hwang, Dongyeop X. Oh and Jeyoung Park, « Preparation of synergistically reinforced transparent bio-polycarbonate nanocomposites with highly dispersed cellulose nanocrystals », Royal society of chemistry, 21, 2019, 5212-5221

https://pubs.rsc.org/en/content/articlelanding/2019/gc/c9gc02253h#!divAbstract

RECENTLY PUBLISHED ON THE CHEMICALS SUBSTITUTION WEBSITE...

- France has initiated steps to classify bisphenol B as an endocrine disruptor
- European RoHS Directive: a derogation has been granted for some applications of DEHP.

COMING SOON

Pharmapack in Paris (France) from 05 to 06 February 2020

The presentation of a manual for the substitution of PVC in flexible pharmaceutical packaging is part of the PHARMAPACK exhibition programme. During this event, innovations in the field of pharmaceutical packaging will also be presented.

https://www.pharmapackeurope.com/fr/agenda?title_field_value=pvc&field_related_speaker_target_id_entityreference_filter_1=All&field_session_topic_tid_selective=All&field_session_type_tid_selective=All

THE WATERBORNE SYMPOSIUM in La New Orleans (USA) from 16 to 21 February 2020

This congress is intended in particular for researchers and formulators in the field of coatings.

https://www.waterbornesymposium.com/

FESPA 2020 in Madrid (Spain) from 24 to 27 March 2020

FESPA is a trade fair for professionals in the field of printing industry, which will offer the opportunity to learn about new technologies and innovative solutions in the different fields of printing that could potentially replace ethoxylated nonylphenols.

https://www.fespa.com/en/events/2020/global-print-expo-2020

If you have any questions, please contact us:
https://substitution.ineris.fr/en/contact

https://substitution.ineris.fr/en