Stabilisers – What’s new?

Update January 2016
Outline

- About ESPA
- Lead-based stabilisers
- Calcium-based stabilisers
- Tin-based stabilisers
- Liquid mixed metal stabilisers
- Contribution to VinylPlus
- Conclusions
European Stabiliser Producers Association

- Pan-European trade association representing more than 95% of the PVC stabiliser industry across Europe
- Affiliated to Cefic - the European Chemical Industry Council
- Member of VinylPlus (www.vinylplus.eu)
- A unique organisation representing four chemistries of stabilisers:
  - **ECOSA** – Calcium-based stabilisers (including Ca-Zn and organic) for food contact & medical applications, plus all lead replacement systems
  - **ETINSA** – Tin-based stabilisers used primarily in rigid applications including food contact use
  - **ELISA** – Liquid stabilisers used in a wide range of flexible PVC, calendered sheets, flooring
  - **ELSA** – Lead-based stabilisers used principally in pipes and profiles
ESPA 2016: 10 Members

- AKCROS CHEMICALS
- Akdeniz Kimya
- asua PRODUCTS
- BÆRLOCHER
- Chemson
- Chemtura
- Galata Chemicals
- IKA
- PMC
- Reagens

www.stabilisers.eu
2014 consumption by stabiliser category

EU-28

<table>
<thead>
<tr>
<th>Type</th>
<th>kt/annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>14</td>
</tr>
<tr>
<td>Calcium based</td>
<td>92</td>
</tr>
<tr>
<td>Liquid MM</td>
<td>13</td>
</tr>
<tr>
<td>Tin</td>
<td>11</td>
</tr>
<tr>
<td>TOTAL*</td>
<td>130</td>
</tr>
</tbody>
</table>

* as formulated stabilisers
Lead-based stabilisers substitution

ESPA target

- To replace lead stabilisers by end 2015 in EU-28, as part of the VinylPlus Voluntary Commitment

ESPA achievement

- Substitution of lead-based stabilisers in EU-28: Minus 86% over the period 2007 – 2014
- In 2015 the substitution continued and was completed by the year end (graph on the next slide – the yellow dashes reflect real sales data)
- ESPA members are in the process of opening their books to an external auditor to document the effective completion of the substitution
Lead-based stabilisers substitution

Stabilisers Sales in the EU-28 by ESPA Members

- **Tonnes**

- **Substituted!**
Lead-based stabilisers and REACH

- Inclusion in the REACH Candidate List in December 2012
  - all the lead stabilisers were identified as SVHC* and included in the REACH Candidate List (CL), strictly on the basis of their CMR** classification.
  - Substances on the CL can be prioritized for Authorisation

- Restriction of the use of lead stabilisers (*in preparation*)
  - Last December ECHA announced their intention to submit a restriction proposal (Annex XV) by 7 October 2016

* SVHC: Substances of Very High Concern ** CMR: Carcinogenic, Mutagenic, Reprotoxic
Restriction of lead in consumer articles

• Reg. EU 2015/628 of 22 April 2015 amending REACH Annex XVII
• **Scope**: articles available to consumers and which
  – could be placed in the mouth by children
  – contain more than 0.05% weight of lead
• **Relevance for PVC**:
  – No issue with articles made from virgin PVC, which should not contain lead-based stabilisers anymore as from 1st Jan. 2016
The Circular Economy package, adopted by the European Union, does encourage recycling instead of landfill.

Recycling targets include:
- 80% recycling for packaging (glass, paper, metal & plastic) by 2030
- Ban on landfilling of all recyclable & biodegradable waste by 2025

PVC is increasingly recycled and gets a strong impulse from the VinylPlus programme.

ESPA and VinylPlus are studying the migration of legacy additives* (including lead) from the PVC matrix to demonstrate that they pose no risk for the use of articles made thereof.

* Legacy additives: substances whose use in PVC products has been discontinued but that are contained in recycled PVC.
Calcium-based stabilisers

- Calcium-based stabilisers (Ca-Zn and Ca-organic) are principally used for:
  - food contact & medical applications
  - all lead replacement systems
- There are no known REACH registration issues for the main system components of this family of stabilisers
- Stabilisers of this group are of particular relevance within the scope of the VinylPlus Task Force “Sustainable Use of Additives” (see slide 22)
Tin stabilisers: families

Similar structures based on the following combinations of 4 organic groups (R1 to R4) attached to a central tin atom by a C-Sn bond:

- one [two] alkyls (methyl, butyl or octyl) with
- three [two] esters (e.g., a thioglycolate)

3 main families of tin stabilisers:

- **Methyltins**
- **Butyltins**
- **Octyltins**

Each family is split in *mono-alkyl* and *di-alkyl*, with reference to the major constituent (the commercial substances may contain both in variable proportions).
## Tin-based stabilisers: CMR classifications

<table>
<thead>
<tr>
<th>Stabiliser</th>
<th>CMR classifications (CLP)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMTE</td>
<td>Reprotoxic cat. 2</td>
<td>No restrictions</td>
</tr>
<tr>
<td>DMTE</td>
<td>Reprotoxic cat. 2</td>
<td>No restrictions</td>
</tr>
<tr>
<td>MBTE</td>
<td>None</td>
<td>No restrictions</td>
</tr>
<tr>
<td>DBTE</td>
<td>Reprotoxic cat. 1B</td>
<td>Severe restrictions in REACH Annex XVII for dibutyltins</td>
</tr>
<tr>
<td>MOTE</td>
<td>None</td>
<td>No restrictions</td>
</tr>
<tr>
<td>DOTE</td>
<td>Reprotoxic cat. 1B</td>
<td>Request for reclassification of lower reprotoxicity was submitted based on recently developed data</td>
</tr>
</tbody>
</table>

M and D as first letters = Mono & Di ; E = Ester (see previous slide “tin stabilisers families”)

www.stabilisers.eu
REACH: CoRAP and PACT

- **CoRAP** (Community rolling Action Plan)
  According to Reach Art. 41.5 the ECHA shall conduct a compliance check on at least 5% of the Registration dossiers. The CoRAP list indicates substances for evaluation by the Member States in the next three years and is updated each year in March.

- **PACT** (Public Activities Coordination Tool)
  Lists the substances for which a risk management option analysis (RMOA) or an informal hazard assessment for PBT*/vPvB** properties or endocrine disruptor properties is under development/ completed since the implementation of the SVHC Roadmap commenced in February 2013. The PACT is updated monthly.

* PBT: **Persistent, Bioaccumulative, Toxic**
** vPvB: very **Persistent, very **Bioaccumulative**
Tin stabilisers and Reach

All components used in commercially relevant tin stabilisers have been REACH registered

<table>
<thead>
<tr>
<th>Process</th>
<th>Short name</th>
<th>EC number</th>
<th>CAS number</th>
<th>Inclusion Date</th>
<th>ETINSA comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoRAP</td>
<td>MMTE</td>
<td>260-828-5</td>
<td>57583-34-3</td>
<td>2015</td>
<td>Additional toxicological information provided; no classification change or restrictions expected</td>
</tr>
<tr>
<td>PACT</td>
<td>DMTE</td>
<td>260-829-0</td>
<td>57583-35-4</td>
<td>Sept. 2014</td>
<td>Additional information provided; no classification change or restrictions expected</td>
</tr>
</tbody>
</table>
Liquid Mixed Metal Stabilisers

- used principally for flexible PVC, calendered sheets and flooring
- have been almost totally reformulated over the last years owing to REACH and re-classification of some components
- the Liquid Mixed Metal Consortium has completed the REACH registrations due in 2013 and is pursuing the work for the remaining ones for Tier 3
The Natural Step Framework: Internationally recognised method for sustainability planning (www.thenaturalstep.org)
The VinylPlus Programme

- **VinylPlus**: the new ten-year Voluntary Commitment of the European PVC industry ([www.vinylplus.eu](http://www.vinylplus.eu))

- VinylPlus continues and expands the successful Vinyl 2010 programme founded in 2000 by ESPA and other actors in the PVC supply chain.

- Derived from the framework set-up by **TNS**

- It is built around 4 + 1 challenges →

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**TNS: The Natural Step** – a non profit organisation founded in 1989 - [www.naturalstep.org](http://www.naturalstep.org)
2000 – 2010

2011 – 2020…and beyond

2014 expenditure: 5.75 million EUR
entirely funded by
the members of the 4 founding associations
VinylPlus and the *Sustainable use of additives*  

- **The TNS criteria** provide a sound overarching framework to address the global aspect of sustainability.

- **ESPA** is particularly active in the *VinylPlus Additives Task Force*, developing an « EPDplus » scheme.

- The EPDplus build on the well established EPD standards, with the « *plus* » aiming to address the additional aspects covered in the TNS framework.
Conclusions

- PVC stabilisers are present in a PVC compound at a low percentage only but they are crucial ingredients to produce articles and maintain their properties throughout their entire life cycle.

- ESPA members are continuously adapting the stabilisers to address the new regulatory constraints, including REACH.

- ESPA is contributing in a decisive way to address the challenge of sustainability of PVC through the Voluntary substitution of lead-based stabilisers and through its contribution to the VinylPlus Task Forces.

- ESPA members are devoting important resources to R&D to supply performing solutions to the PVC chain.
More info on stabilisers: [www.stabilisers.eu](http://www.stabilisers.eu)

**STABILISERS**

Stabilisers are added to PVC to allow its processing and to improve its resistance especially in outdoor applications, weathering and heat ageing and have an important influence on the physical properties of PVC finished articles. Factors such as process technology involved, technical requirements of PVC end product, regulatory requirements and cost, influence the choice of the stabiliser used.

**HIGHLIGHTS**

- **Stabilisers – What’s New**
  Pan-European trade association representing more than 95% of the PVC stabiliser…

- **The Journey to a Lead-Free Stabilisers Industry in Europe**
  In 2000, the European Stabiliser Producers (ESPA) committed to replace lead-based…

- **PVC Stabilisers & Sustainability**
  To allow to meet the needs of the present without compromising…
Thank you for your attention

Contact: Dr. Alain Cavallero, ESPA Secretary General – aca@cefic.be