AFIRM Chemical Guidance Document

Phil Patterson
Colour Connections Consultancy Ltd
(Restricted Substance Advisor to Pentland Brands)
AFIRM Seminar, Vietnam
13th November 2014
The Author

Dr Dieter Sedlak

A world renowned chemical expert

A highly valued advisor to the footwear and apparel sector
It’s not a chemistry lesson!

My Job: To tell you what is in the document

You don’t need to understand the detailed chemistry but ..........

you need to understand the importance of chemical detail
It is not a novel....... 

.....it is a fabulous resource for experts in your team.
The Aim
### What’s in there?

- Chemicals associated with textiles
- Chemicals associated with leather
- Chemicals associated with polymers
- Process Chemicals
- Adhesives / coatings
- Printing
What’s in there?

• The Chemicals in every type of formulation:-
  – Dyes
  – Lubricants
  – Softeners
  – Resins
  – Anti-stats
  – Flame Retardants
  – Water-repellents
  – Anti-microbials
  – Pigments
  – ………………………………………
Forget the chemicals for a moment.....

.....it is a excellent text book for understanding textile and leather manufacturing processes
Beyond RSL Compliance

• EVERYTHING you need to know about apparel and footwear chemicals
• RSL compliance
• Chemical management best practice
An Holistic Approach

• Aimed at reducing chemical consumption and chemical emissions and not just meeting Restricted Substance Standards
Environmental Impacts

- A sense of perspective given for different products and processes
- Indicative water and energy consumption for most common processes
The Importance of Full Information

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Typical Composition of Flame Retardant Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 g/l</td>
<td>Polysiloxane formulation</td>
</tr>
<tr>
<td>20 g/l</td>
<td>Stearylurea formulation</td>
</tr>
<tr>
<td>2 g/l</td>
<td>Phosphoric acid ester formulation</td>
</tr>
<tr>
<td>20 g/l</td>
<td>Melamine resin</td>
</tr>
<tr>
<td>70 g/l</td>
<td>Dimethylol dihydroxy ethylene urea resin</td>
</tr>
<tr>
<td>25 g/l</td>
<td>Phosphoric acid</td>
</tr>
<tr>
<td>400 g/l</td>
<td>Alkylphosphonic acid ester</td>
</tr>
<tr>
<td>458 g/l</td>
<td>Water</td>
</tr>
</tbody>
</table>
The Importance of Full Information

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Typical Composition of Flame Retardant Formulation</th>
<th>Actual Composition of Substances Listed in Flame Retardant Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 g/l</td>
<td>Polysiloxane formulation</td>
<td>20 % Polysiloxane with chain distribution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 % Oligosiloxane, cyclic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 % Acetic acid, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 % Fatty alcohol, ethoxylate, by-products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 % Glycerol, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 % Fatty amine, ethoxylate, by-products</td>
</tr>
<tr>
<td>20 g/l</td>
<td>Stearylurea formulation</td>
<td>20 % Methylolated stearylurea, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.7 % Ethanediol, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3 % Methanol, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 % Disobutoxymethane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 % Isobutanol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.2 % Formaldehyde</td>
</tr>
<tr>
<td>2 g/l</td>
<td>Phosphoric acid ester formulation</td>
<td>50 % Phosphoric acid butylester, technical</td>
</tr>
<tr>
<td>20 g/l</td>
<td>Melamine resin</td>
<td>50 % Trimethyl(methylol)melamine ether, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 % Ethanediol, technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 % Toluene2sulfonic acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 % Formaldehyde</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 % Inorganic salts</td>
</tr>
</tbody>
</table>
Figure 1.3: Basic Scheme of Inputs to Textile Finishing Industry (Austria)

Total inputs: 28,000 tons/year (organics and inorganics)

- Approx 5400 t organics from raw materials
- 4550 t inorganics
- 2045 t organics
- 105 t organic detergents
- 8435 t inorganics
- 1348 t organic formulations
- 730 t inorganics
- 970 t organic formulations
- 4183 t organics
Consider Outputs

Figure 1.4: Basic Scheme of Outputs from Textile Finishing Industry (Austria)

Total emissions to water and air: about 16,000 tons/year (organics and inorganics)

- 3580 t inorganics (water)
- 545 t organics (water)
- 5200 t organics from raw materials (water)
- 200 t organics from raw materials (air)
- 450 t inorganics (water)
- 110 t organics (air)
- 470 t organics (water)
- 55 t organics (air)
- 35 t organics (water)
Inputs / Outputs

• Managing inputs
  – Manages RSL compliance
  – Manages effluent and air emissions to a large extent
Consider Harmful Chemicals

- **Hazard**
- Understand where harmful chemicals are present
- **Risk**
- Look for lower impact alternatives
- Learn how to minimise exposure
Consider Chemical Volumes

- Reduction of volumes used reduces exposure
- Achieved by:
  - Removing unnecessary chemical use
  - Reducing water consumption
  - (Reducing energy consumption)
Where are Harmful Chemicals Hiding?

• Many Places
  – In fibres
  – In oils
  – In lubricants
  – In dye formulations
  – In chemical formulations
  – In adhesives
  – In coatings

• AND................................
Consider Further Reactions

- It’s not just what’s in the formulation

- In chemistry....

\[ A + B = A + B + C + D + \text{Cousin of } A \text{ etc!!} \]
The Chemical Guidance Document

• Helps
  – Understand where you may find harmful chemicals
  – Learn how to minimise use harmful chemicals
  – Learn how some harmful chemicals are formed during processing
The Chemical Guidance Document

- The concept of zero harmful chemicals has zero credibility
- Makes it clear that complete avoidance of chemicals is impossible
- Chemicals are a necessary part of the modern world but they need to be understood and managed
<table>
<thead>
<tr>
<th>Where can you find this information?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• AFIRM website</td>
</tr>
<tr>
<td><a href="http://afirm-group.com/suppliersltool.htm">http://afirm-group.com/suppliersltool.htm</a></td>
</tr>
</tbody>
</table>