

The Health Fitout: Material Selection Review for New Fit Outs

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Scope of Investigation(s)

- This presentation does not aim, or intend to determine a source for elevated results presented within any case studies, nor does it intend to imply the suitability of any one material.
- The case histories are presented within the theme of this materials selection paper to illustrate practical examples of the impact of materials emissions.
- The data presented in this paper should be considered to be dynamic, since clients, regulators, manufacturers and administration bodies influence continuous improvement in product performance.

Outline



- Introduction
- Typical Emission Rates of Common Products
- Case Study - Polymer Floor Coating
- Conclusion

Introduction



What is a VOC?

- “Volatile Organic Compound”
- According to the World Health Organisation (WHO) VOC’s are defined as organic compounds with boiling points between 50°C and 260°C, except for pesticides¹
- Or in other words that “fresh new” car smell or when you’re painting etc



<http://forums.vwvortex.com/showthread.php?871125-Audi-smell-to-be-gone>

How are VOC's Measured?

- Sample is placed in an air tight sealed electro polished stainless steel container
- Clean air is passed through the chamber over the sample and any VOCs are collected onto absorbent tubes such as activated charcoal
- Analysed via a GC-MS



Typical Emission Rates of Common Products



Background



- Accumulation of emission data collected by CETEC over a ten year period



Typical Emission Rates from Flooring

Flooring	Total VOC Emission (mg/m ² /hr)
Carpet (Local)	0.1 – 0.3
Carpet (Imported)	0.2 – 0.7
Vinyl (Local)	0.05 – 0.2
Vinyl (Imported)	4
Rubber	0.5 – 2
Cork	0.1 – 0.4
Lacquered Timber	0.1 – 0.3



Typical Emission Rates from Insulation



Insulation	Total VOC Emission (mg/m ² /hr)	Formaldehyde (mg/m ² /hr)
Fibreglass Insulation (Local)	0.1 – 0.3	0.02 – 0.1
Fibreglass Insulation (Imported)	0.2 – 0.7	0.1
Polyester Insulation	0.05 – 0.2	<0.05
Rubber Insulation	4	<0.05



Typical Emission Rates from Fitout Items

Fitout	Total VOC Emission (mg/m ² /hr)
Natural Wood	0.2 – 0.5
Coated Wood	<0.1
Steel/Aluminium	<0.01
Plastic	<0.05 – 0.2
Upholstery Fabric	<0.05 – 0.2
Solvent Based Glue	5
Water Based Glue	<0.05



Certification Systems in Australia



- Green Building Council of Australia (GBCA)
 - 500 $\mu\text{g}/\text{m}^2/\text{hr}$ TVOC
 - 100 $\mu\text{g}/\text{m}^2/\text{hr}$ Formaldehyde
- Carpet Institute of Australia (CIA)
 - 500 $\mu\text{g}/\text{m}^2/\text{hr}$ TVOC
 - Chemicals of concern
- Good Environmental Choice Australia (GECA)
- Ecospecifer
- Australasian Furnishing Research & Development Institute (AFRDI)
- Additional international certification schemes...e.g. Leadership in Energy & Environmental Design (LEED)

Case Study: Polymer Floor Coating



Case Study

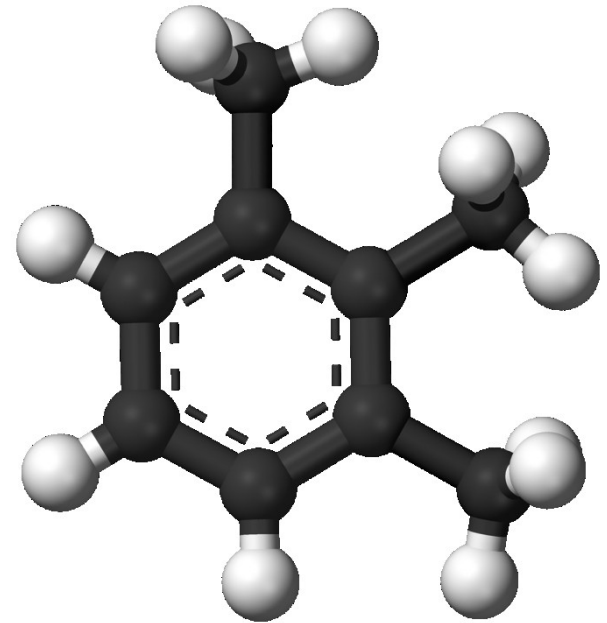
- New two storey residence, contractor to apply a finish to the timber floorboards- low VOC finish specifically requested
- After a few months occupants complained about suffering from headaches & dizziness



Case Study Cont'd



- Airborne VOC concentrations of 2,087 $\mu\text{g}/\text{m}^3$ on ground floor and 3,582 $\mu\text{g}/\text{m}^3$ on first level were measured
- Typical indoor environmental concentration should be $<500\mu\text{g}/\text{m}^3$
- Breakdown of emissions showed high concentration of xylene and substituted benzenes
- Individual environmental limit for compounds should be $<250\mu\text{g}/\text{m}^3$
- Substituted benzenes were four times above this limit



Case Study Cont'd



- Xylene of greater concern. It's known to exhibit health effects including irritation, discomfort, lack of muscle coordination, dizziness and headaches
- This case study identified:
 - VOC emission issues relating to materials selection within a residence can easily be compared and extended to that of an office environment, where the effect on productivity would have had a greater financial impact

Conclusion

- Architects & consumers are becoming more “VOC conscious”
- Products need to be tested for their VOC emission rates before being used in new buildings as a preventative measure
- This saves on the loss of productivity and financial burdens



For additional information please don't
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