12th CONCAWE Symposium
Future of Specialty Products
Waxes

Dr. Dirk F. Danneels
European Wax Federation
• Side stream of lube oil production
• Wax definition:
  – Solid at 20°C (soft and flexible to brittle and hard)
  – Melts above 40°C without decomposition
  – Low viscosity little above melting point
• Complex supply chain including additional purification and blending steps
• Tight quality specs imposed by regulators and customers
  – Food contact, pharmaceutical and cosmetics
Fractionation and Chemical Processing (simplified)

- **Distillation**: Approximate cut points indicated
- **Conversion / upgrading processes**: Subsequent distillation steps combined
- **Hydrodesulfurization / others omitted**

**Crude Oil**
- Atmospheric distillation
  - 0-85°C: Naphthas
  - 85-165°C: Kerosine
  - 165-235°C: Gas oils
  - 235-300°C: Gas oils
  - 300-350°C: Gas oils
  - 350°C+: Residue

- Vacuum distillation
  - 450°C: Gas oils
  - 550°C+: Residue

- Catalytic cracker
  - Olefins
  - Naphthas
  - Gas oils

- Hydrocracker
  - Naphthas
  - Gas oils
  - Residue

- Thermal cracker
  - Naphthas
  - Gas oils
  - Residue

- Reforming
  - Reformate
  - Aromatics

- Solvent extraction & others
  - Aromatic extracts
  - Lubricants
  - Waxes
  - Foots oils & Petrolatum
  - Bitumen / Asphalt

**Main product type**
- Gasoline
- Distillate fuels
- Residual fuels
- Bitumen
- Others

**Distillation**
- Atmospheric distillation
- Vacuum distillation

**Conversion / upgrading processes**
- Catalytic cracker
- Hydrocracker
- Reforming
- Solvent extraction & others

**Alkylation**
- Alkylate
Comparison wax and Oil Chromatograms

LMPW: Paraffine
52-54

White Mineral Oil P15
5x expanded

High Temperature GC
Functional Properties and Uses of MHC Waxes

Etymology: Paraffin (n.) coined c. 1830 by German chemist Karl von Reichenbach (1788-1869), irregularly from Latin parum "not very, too little," probably related to parvus "little, small" (see parvi-) + affinis "associated with" (see affinity).

• Important functional properties
  - Lubrication and release
  - Moisture barrier
    • Keeping moisture in – Cheese Wax, Fruit Coating
    • Keeping moisture out – Paper and Board Coating
  - Solid at room temperature, low viscosity when molten
    • Viscosity modification, hot melt adhesives
  - Very inert and non-allergenic materials

• Non-food related uses
  - Candles (Fuel)
  - Rubber (Anti-ozonant)
  - Cable filler (Moisture protection)
Need to comply with different, sometimes mutually incompatible requirements
EU Level Food Contact - Overview

(UC) No. 1935/2004
Framework Regulation

(UC) No. 2023/2006
Good Manufacturing Practice

Non-Harmonized Materials and Articles

2007/42/EC Regenerated Cellulose Film
84/500/EEC Ceramics
EU 10/2011 Plastics

Elastomers and Rubbers
93/11/EEC Nitrosamines
EC/450/2009 Active & intelligent materials

Paper & Board
Glass
Wood
Cork
Metal and Alloys
Textiles
Adhesives
Ion-exchange Resins
Printing Inks
Silicones
Varnishes and Coatings
Waxes
Current Challenges

• Regulatory Framework
  – Uncertainty on harmonized EU Food Contact Material rules
    • Cross-Sector Group Food Contact Materials

• NGO Driven consumer concerns
  – MOSH/MOAH in food packaging and cosmetics
    • MOCRINIS 2 scheduled in October 2017