Oleochemistry

Introduction

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Welcome to Oleochemistry!

- About the course
- About the lecturer
- Who are the class representatives?

The students should be able to understand:

- Oleochemistry in general
- Historical development
- The challenges in development
- Main producers of oleochemicals
- Important cost factors
- Interesting issue in oleochemistry

Introduction

The Chemical Industry

- involves the companies that produce industrial chemicals.
- essential to modern world economy, transforming raw materials (oil, natural gas, air, water, metals, minerals) into more than 70,000 different products.
- industry itself consumes more than 25 percent of its own output.

CHEMICAL PRODUCTS

Product Type	Examples
Inorganic industrial	ammonia, nitrogen, sodium hydroxide, sulfuric acid
Organic industrial	acrylonitrile, phenol, ethylene oxide, urea
Ceramic products	silica brick, frit
Petrochemicals	benzene, ethylene, styrene
Agrochemicals	fertilizers, insecticides, herbicides
Polymers	polyethylene, Bakelite, polyester
Elastomers	polyisoprene, neoprene, polyurethane
Oleo chemicals	soybean oil, stearic acid
Explosives	nitroglycerin, ammonium nitrate, nitrocellulose
Fragrances and flavors	benzyl benzoate, coumarin, vanillin

OLEOCHEMISTRY IN GENERAL

- **OLEO CHEMISTRY** is the study of oils and fats from trees and animals

- No petrochemical used as the raw materials

- In early days, they used as soaps, nowadays oleochemistry is now in every parts of our daily lives
- It can be found in a wide-ranging of segments like body care, cosmetics, food, pharmaceutical and industrial.

HISTORICAL DEVELOPMENT

- In early days, used of oils and fats directly from natural origin without modification.
  - Lightings
  - Lubricants
  - Cooking oils

- Second half of 19th century: petroleum dominates the chemical industries. People starts concern the depletion of this unrenewable resources.

- Today, return to oils and fats from vegetable and animal (that is renewable resources) to REPLACE petroleum-based and synthetic products

The challenge in oleochemical progression to replace petroleum based chemical industry

- 80% of oils and fats are consumed as food
- 5% are animal feed
- Only 10% are used by industry
- Petroleum are consumed mostly for industry, not for food.
- Need large land for plantation: Deforestation.

PRODUCERS OF OILS AND FATS

ASIA

(mostly Malaysia, Indonesia, Philippines)

Palm oil, Lauric acid (C_{12}) from palm kernel and coconut oil

US & EUROPE

Animal fats, olive, linseed

IMPORTANT COST FACTORS FOR THE CHEMICAL INDUSTRY

1. Raw materials
2. Energy
3. Plant and processing cost

SUSTAINABILITY AND EFFICIENT USE OF RESOURCES ARE EXTREMELY IMPORTANT CONCEPTS

INTERESTING FACTS

ORIGINS OF TRIVIAL NAMES:

PALMITIC ACID (C16) – PALM OIL

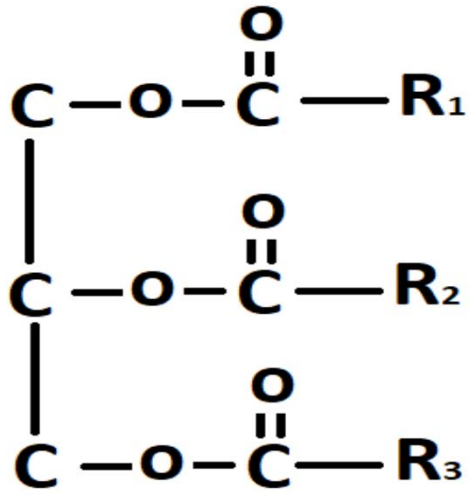
OLEIC ACID (C18) – OLIVE OIL

LINOLEIC (C18) AND LINOLENIC ACID (C18) – LINSEED OIL

ARACHIDIC ACID(C20) – GROUNDNUT OIL

TRIACYLGLYCEROL

- Also known as Triacylglycerides, TAG, triglyceride.
- The main compound in oils and fats
- TAG is a fatty ester that consists of 3 fatty acids (carboxylic acid with long alkyl chain) and one glycerol that covalently bonded to each others.



Interesting Issue in Oleochemistry

- For many years, scientist have been trying to assure consumers that soap and water only are adequate to kill the harmful bacteria.
- However, consumers put more trust on the antibacterial soap when it comes to protecting from disease.
- Ironically, some of the antibacterial active chemicals that added to the antibacterial soap have proven adverse effects:
  - They contribute to produce drug-resistant bacteria
  - Effect negatively to human health by killing the good bacteria
  - High potential to hormones disorder.
  - In term of environmental effect, they cause environmental destruction to flora and fauna.

Conclusion

- **OLEO CHEMISTRY** is the study of oils and fats from trees and animals

- Many challenges to make the oleochemmical as the main resources in chemical industries.

Chapter description

All pictures/photographs/diagrams/figures used in this chapter is subjected to common creative that for education purposes