TEKNIK PRODUK
(TK 7362)

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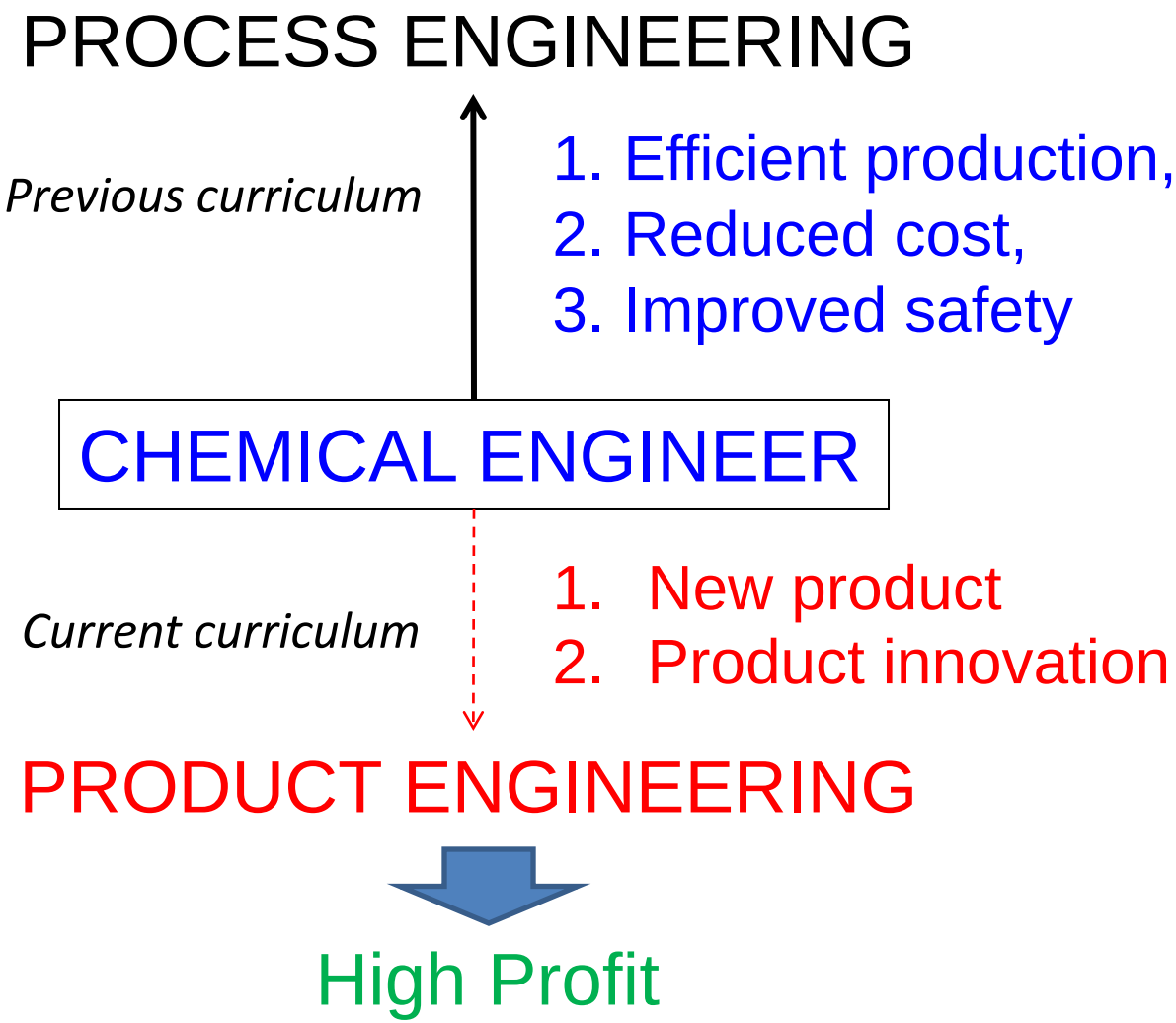
Kisi-Kisi

1. Peranan sarjana teknik kimia dalam inovasi produk.
2. Eksplorasi dan penemuan produk (sejarah penemuan).
3. Pengembangan produk-produk untuk bisnis.
4. Pentingnya hubungan struktur (sifat makroskopis) dan sifat produk (sifat mikroskopis)
5. Penjualan produk (industri dan konsumen)
6. Desain produk .
7. Peluang produk inovasi.

Sarjana Teknik Kimia dan Inovasi Produk



Teknik Kimia dan Proses

Example:

Susu segar (90% air)	→	Susu bubuk (3% air)
Tebu	→	Gula pasir
Batu kapur, lempung, pasir silika, gips	→	Semen

How About New Product ?

Conventional:

Chemist Invent → Chemical Engineer develops process (manufacturing)

New Paradigm:

Chemical engineer can also invent a new product

Example:

Thomas Midgley, Jr. invented both tetraethyl lead and Freon, two of the most celebrated products in the 20th century, but he only had a bachelor's degree in mechanical engineering, and he had to learn on his own the chemistry of structure–property relations.

Product Engineering Curriculum

Approaches of course contents:

1. Introducing the subject by the historic case method. (This shows the patterns of past successes, which methods were fruitful, and which paths were barren.)

2. Providing useful tools in the search for materials that possess the desired properties, as well as ways to modify materials to improve their properties.

3. Doing a product design project, perhaps in parallel with the traditional process design project, which must take into consideration market needs and safety and environmental impacts.

The Needed Knowledge

Main tool:

Product engineering and molecular structure–property relations can follow the advances of unit operations and transport phenomena, and become the Third Paradigm of Chemical Engineering.

Supplements:

- Modern computer software and the Internet

Chemical Products

1. *Commodity Chemicals*
2. *Specialty Products*

Commodity Chemicals

- Berjumlah banyak (kuantita)
- Kualitas standard (relatif sama)
- Komposisi kimia sebagai parameter penting
- Harga tidak terlalu tinggi (relatif)
- Banyak produsen
- Faktor harga sangat menentukan daya saing
- Efisiensi proses sangat esensial
- Contoh : semen, bensin, pupuk, minyak goreng, etanol, deterjen, dll

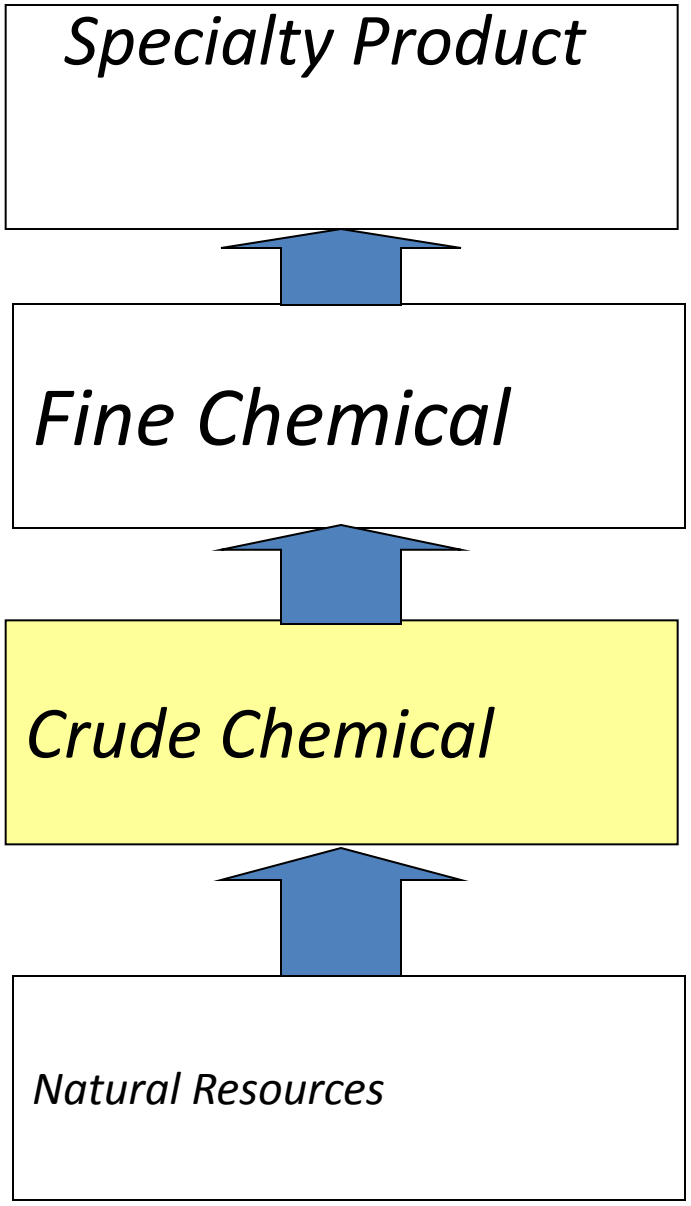
Specialty Chemicals

- Berjumlah sedikit (kuantita)
- Kualitas menjadi daya saing utama
- Komposisi kimia bukan parameter utama
- Harga sangat tinggi
- Features sangat menentukan daya saing
- Jumlah produsen terbatas, karena seleksi persaingan
- Faktor harga kurang dominan pada daya saing
- Selalu terjadi perlombaan peningkatan kualitas
- Efisiensi proses kurang menentukan daya saing
- Contoh : parfum, kosmetik, obat, pembersih, dll

The Important of Specialty Chemicals

- Keuntungan industri *specialty product* relatif tinggi
- Indonesia kaya bahan untuk membuat *specialty product*
- Kualitas penting untuk *commodity chemicals*, apalagi untuk *specialty product*

The Flow of Chemical Products



The Important of Specialty Chemicals

1. *Quality*
2. *Quantity*
3. *Cost*
4. *Safety*
5. *Environment*
6. *etc.*

For fine chemicals and specialty products, quality is the main attribute

(produk Indonesia umumnya baru sampai *crude chemicals*)

Specialty Product?

Contoh Perbandingan Harga

Nama	Sumber	Spesifikasi	Harga ($/kg)
Minyak nilam (*patchouli oil*)	Tanaman nilam (*Pogostemon cablin*)	Crude	35
		Absolute patchouli alcohol	1275 ($255/240mL)
Minyak cengkeh (*clove oil*)	Tanaman cengkeh – daun, batang, bunga (*Eugenia caryophyllata*)	Crude	18
		Purified	40
		Absolute eugenol	190
Minyak pala (*nutmeg oil*)	Biji pala	Crude	35
		Absolute trimyristin	600
Minyak kenanga (cananga oil, ylang-ylang oil)	Bunga kenanga (*Cananga odorata*)	Crude	29
		Purified	3563 ($28.5/10mL)
Minyak jahe (*ginger oil*)	Rimpang jahe	Crude	95
		Purified	1938 ($15.5/10mL)
Minyak sereh (*citronella oil*)	Daun sereh	Crude	5
		Purified	725 ($5.8/10mL)

Specialty Chemicals

Membuat *specialty product* berbasis *fine chemicals* disebut :

formulation engineering

- *Specialty products* umumnya terdiri banyak komponen kimia (bisa puluhan)
- Mempunyai kualitas-kualitas/sifat-sifat yang sesuai keinginan konsumen
- Komposisi kimia bisa berbeda

Product Engineering

“perancangan produk dan proses dengan orientasi kualitas produk”

Untuk teknik kimia :

Chemical Product Engineering

Parameter kualitas produk sangat diutamakan, bahkan bisa menggeser parameter konversi, *yield*, efisiensi, komposisi kimia, dll.