Tutorial Videos on Solvent Extraction

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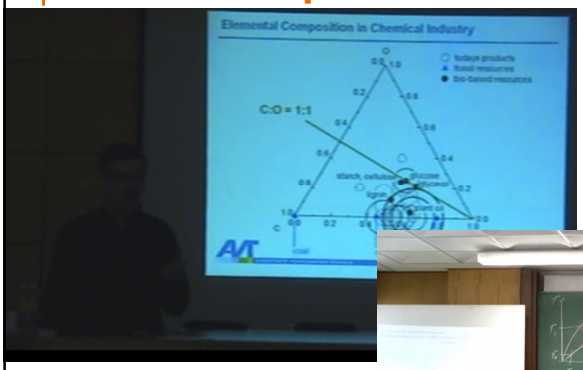
Miyazaki, Japan

agenda

- motivation
- realization
- results
- conclusions & invitations

motivation: previous videos of lectures



requirements

⇒ **record only once with optimal quality:**

- delivering person clearly visible
- projected diagrams sufficiently rich in contrast
- written notes clearly visible
- sound recording with good quality

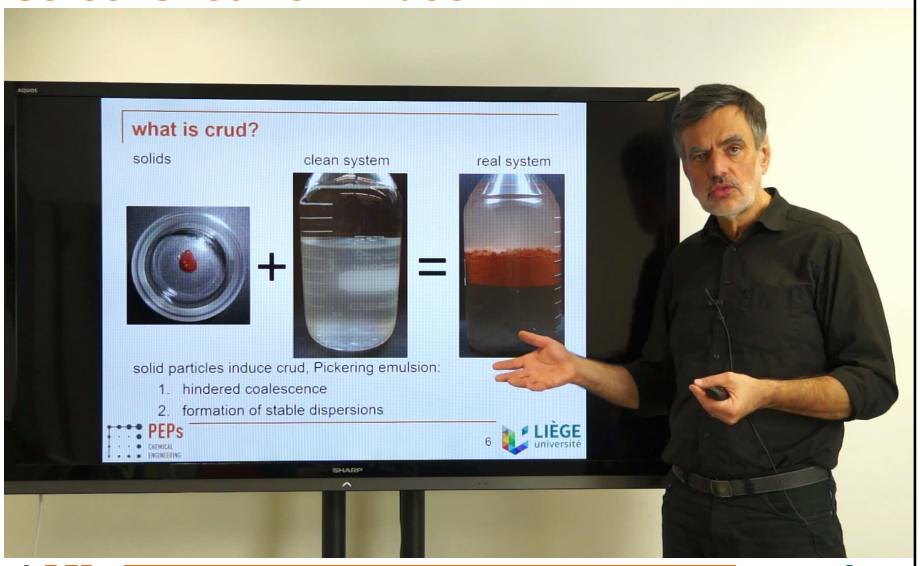
realized studio environment

- large TV screen
- tablet or convertible with program for notes
- 2 studio lights & general room lighting
- sound recording with condenser microphone and 24-bit recording device
- ordinary HD video camera
- video and sound joined and cut with available software
- **thanks to IFRES!**
  Institut de Formation et de Recherche en Enseignement Supérieur
  Université de Liège

general setup

photo by: Olivier Borsu, IFRES
Institut de Formation et de Recherche en Enseignement Supérieur
Université de Liège

screenshot from video



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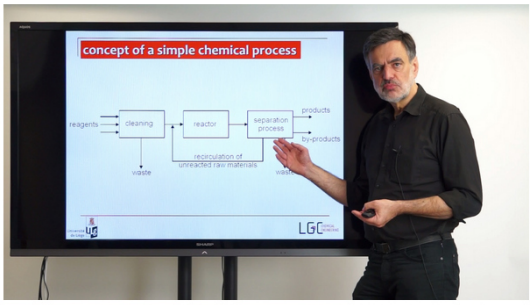
lecture thermal unit operations

Physical Unit Operations 1



The lecture 'Thermal Unit Operations', which are part of the ULg lecture 'Physical Unit Operations 1', is being recorded on video and uploaded to YouTube in the playlist 'Thermal Unit Operations'. Continually further topics will be recorded and uploaded. Here the links to the individual manuscript chapters as well as to the corresponding videos are collected. Where a chapter subtitle is not associated to a video of pdf, the corresponding content is part of the previous pdf or video. Crossed out topics are planned already and will be uploaded in the near future. The numbers refer to the chapters and subchapters of the full manuscript. Not all chapters are contained in this video series, because some chapters are left for an expert course while others are relevant only for introductory lectures of non chemical engineering students. The order of the videos is that in which the course is practically presented, i.e. is arranged in a didactically feasible way. The order of chapters in the manuscript is different, because it is intended as a reference mansucript, which follows a more systematic approach.

Since the course is intended as university course, where it is expected that the students will be able to freely transfer the knowledge to other cases, the listener should expect sufficiently detailed derivations of the methods presented.

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expert course on solvent extraction

Extraction-related content of the lecture Thermal Unit Operations

pdf **Thermal Unit Operations (front matter)**
pdf **1 Introduction**
video 1.2 Principles of thermal separation processes
1.3 Concept of a theoretical stage
video 1.4 Methods of thermal process design
pdf **2 General considerations on counter-current processes**
video 2.1 Step construction, general McCabe-Thiele diagram
video 2.1.1 Balancing the column or a characteristic section of a column
video 2.1.2 Side-stream withdrawal from L
2.1.3 Side-stream withdrawal from G
2.1.4 Addition of feed corresponding to an internal flow
video 2.1.5 Addition or removal of streams with arbitrary composition
video 2.1.6 Addition of transfer component to one of the carriers
2.1.7 Feed to a distillation column or as two-phase mixture
2.1.8 Intermediate heating and cooling in rectification

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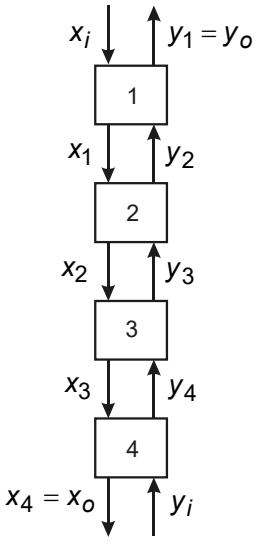
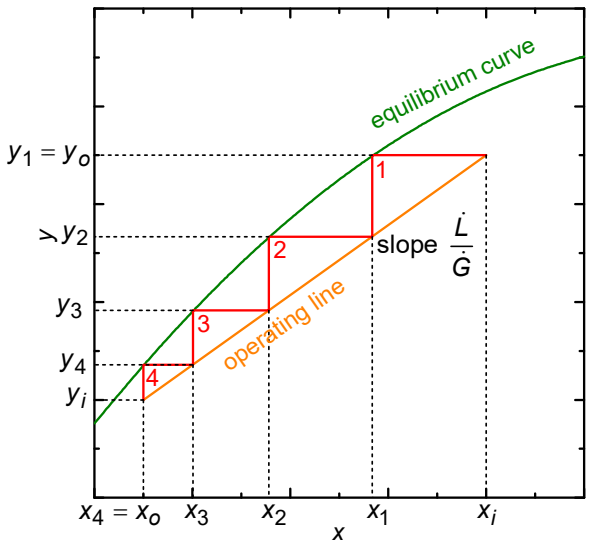
steps for counter-current process





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expert content

- **cascaded option tree and optimal solvent selection**
- **salt influence on interfaces**
  - electrostatic potential difference
  - interaction of several salts
  - quantifying the potential difference
  - effects relevant for solvent extraction
- **crud**
- **drop-based extraction-column design**
  - drop sedimentation
  - mass transfer without internals
  - internals influence on mass transfer
  - drop coalescence
  - drop splitting
  - ReDrop simulations
  - application to challenging systems
- **drop-based settler design**
  - with average drop size
  - accounting for drop-size distribution

conclusions

advantages

- optimized slides
- optimized manuscript
- improved logic in lectures

disadvantages

- record twice on average
- limited extra work for editing and cutting
- major effort: obtaining copyrights of material

the link

- www.chemeng.uliege.be/pfennig

invitations

- visit videos and use the material
  cc: attribution, non-commercial, share alike
- supply material:
  - photos of internals (also used), columns, setups, diagrams, ...
  - videos of tests, real-world equipment and performance
- support with videos:
  - contact me, if you are interested in preparing a video
  - visit us for the recordings

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