

Rigorous Distillation

Spoken Tutorial Project
<https://spoken-tutorial.org>

National Mission on Education through ICT
<https://sakshat.ac.in>

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Learning Objectives



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In this tutorial, we will learn to:



Learning Objectives

In this tutorial, we will learn to:

- **Simulate a Rigorous Distillation column**



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In this tutorial, we will learn to:

- Simulate a Rigorous Distillation column
- Specify column Pressure Profile



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- Simulate a Rigorous Distillation column
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- Specify Tray Efficiencies



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- Check desired product compositions



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- Simulate a Rigorous Distillation column
- Specify column Pressure Profile
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- **View the Column profiles**



System Requirement



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- **DWSIM v 5.8 (Classic UI) Update 3**



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- DWSIM v 5.8 (Classic UI) Update 3
- Windows 10 OS



System Requirement

- DWSIM v 5.8 (Classic UI) Update 3
- Windows 10 OS
- Any OS: Linux, Mac OS X or FOSSEE OS on ARM



Prerequisites



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To practice this tutorial, you should know to



Prerequisites

To practice this tutorial, you should know to

- **Add components to a flowsheet**



Prerequisites

To practice this tutorial, you should know to

- Add components to a flowsheet
- **Select thermodynamic packages**



Prerequisites

To practice this tutorial, you should know to

- Add components to a flowsheet
- Select thermodynamic packages
- Add material and energy streams and specify their properties



Prerequisite Tutorials and Files

- <https://spoken-tutorial.org>



Prerequisite Tutorials and Files

- <https://spoken-tutorial.org>
- **You can access these tutorials and all the associated files from this site**



Code Files



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- **shortcut-end** file used in the tutorial is provided as a Code file on this tutorial page



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- **Download the file from Code Files link**



Specifications

Compounds	Benzene, Toluene	
Thermodynamics	Raoult's law	
Feed	Flow rate Pressure Mole fractions	100 Kmol/h 1 atm Benzene = 0.4 Toluene = 0.6
Method	Fenske-Underwood-Gilliland	



Column Properties

Reflux ratio	1.4 times Minimum Reflux Ratio	
Compound	Light Key (LK) Heavy Key (HK)	Benzene Toluene
Product	Distillate Bottoms	$x_D = 0.99$ $x_B = 0.01$



Solution

Parameter	Value
Min. reflux ratio	1.655
Min. number of stages	11
Actual number of stages	20
Optimal feed location	9
Bottoms product rate	60.204 kmol/h



Summary

- **Simulate a Rigorous Distillation column**
- **Specify column Pressure Profile**
- **Specify Tray Efficiencies**
- **Check desired product compositions**
- **View the Column profiles**



Assignment

Compounds	Ethanol, Water	
Thermodynamics	Raoult's law	
Feed	Flow rate	100 Kmol/h
	Pressure	1 atm
	Mole fractions	Ethanol = 0.5
		Water = 0.5



Assignment

Reflux ratio	1.5 times Minimum Reflux Ratio	
Compound	Light Key (LK) Heavy Key (HK)	Ethanol Water
Product	Distillate Bottoms	$x_D = 0.99$ $x_B = 0.01$



About the Spoken Tutorial Project

- Watch the video available at https://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- It summarises the Spoken Tutorial project



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Spoken Tutorial Workshops

The Spoken Tutorial Project Team,

- Conducts workshops using spoken tutorials
- Gives certificates to those who pass an online test
- For more details, please write to contact@spoken-tutorial.org



Forum for specific questions

- Do you have questions in this Spoken Tutorial?
- Please visit <https://forums.spoken-tutorial.org>
- Choose the minute and second where you have the question
- Explain your question briefly
- Someone from the FOSSEE team will answer them



DWSIM Flowsheeting Project

- The FOSSEE team coordinates conversion of existing flowsheets
- We give honorarium and certificates for those who do this
- For more details, please visit this site
<https://dwsim.fossee.in/flowsheeting-project>



Lab Migration Project

- The FOSSEE team helps migrate commercial simulator labs to DWSIM
- We give honorarium and certificates for those who do this
- For more details, please visit this site
<https://dwsim.fossee.in/lab-migration-project>



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