

# Sensitivity Analysis, Adjust

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:



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- **Determine the exact Reflux Ratio for a separation**



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In this tutorial, we will learn to:

- Determine the exact **Reflux Ratio** for a separation
- **Perform Sensitivity Analysis and Adjust operation**



# System Requirement



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



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- Windows 10 OS



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- 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



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- **Open a simulation file in DWSIM**



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To practice this tutorial, you should know to

- Open a simulation file in DWSIM
- **Carry out rigorous distillation simulation**



# Prerequisites

To practice this tutorial, you should know to

- Open a simulation file in DWSIM
- Carry out rigorous distillation simulation
- **Add components to a flowsheet**



# Prerequisite Tutorials and Files

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



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



# Code Files



# Code Files

- **rigorous.dwxml** file used in the tutorial is provided as a Code file on this tutorial page



# Code Files

- **rigorous.dwxmlz** file used in the tutorial is provided as a Code file on this tutorial page
- **Download the file from Code Files link**



# Problem Solved in a Prerequisite Tutorial: rigorous.dwxmz

- **Components: Benzene, Toluene**
- **Reflux ratio: 2.317**
- **Benzene mole fraction **desired** in distillate = 0.99**
- ****Achieved** mole fraction = 0.988**



# Problem Solved in a Prerequisite Tutorial: rigorous.dwxmz

- **Components: Benzene, Toluene**
- **Reflux ratio: 2.317**
- **Benzene mole fraction **desired** in distillate = 0.99**
- ****Achieved** mole fraction = 0.988**
- **How do we improve the purity?**



# Problem Solved in a Prerequisite Tutorial: rigorous.dwxmz

- Components: Benzene, Toluene
- Reflux ratio: 2.317
- Benzene mole fraction **desired** in distillate = 0.99
- **Achieved** mole fraction = 0.988
- How do we improve the purity?
- Increase the reflux ratio



# Summary

- **Determine the exact Reflux Ratio for a separation**
- **Perform Sensitivity Analysis and Adjust operation**



# Assignment 1

<b>Compounds</b>	<b>Acetone, Water</b>	
<b>Thermodynamics</b>	<b>Raoult's law</b>	
<b>Feed</b>	<b>Flow rate</b>	<b>100 mol/s</b>
	<b>Pressure</b>	<b>1 atm</b>
	<b>Mole fractions</b>	<b>Acetone = 0.7</b> <b>Water = 0.3</b>



# Column Configuration

Parameter	Value
Number of stages	13
Feed Stage	8
Reflux Ratio	0.70611
Mole flow rate of bottoms	29.592 mol/s



# Assignment 2

- Perform sensitivity analysis on the simulated distillation column
- To find the reflux ratio such that mole fraction of water in bottoms is 0.99
- Using Adjust/Controller Block, verify the results obtained using the analysis



# About the Spoken Tutorial Project

- Watch the video available at [https://spoken-tutorial.org/What\\_is\\_a\\_Spoken\\_Tutorial](https://spoken-tutorial.org/What_is_a_Spoken_Tutorial)
- It summarises the Spoken Tutorial project



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- It summarises the Spoken Tutorial project
- If you do not have good bandwidth, you can download and watch it



# 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](mailto: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>



# Acknowledgements

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# Thanks

- **This tutorial was originally recorded by Prof Kannan Moudgalya in September 2015**

