Absorption Column using CAPE-OPEN Unit Operation

Spoken Tutorial Project
http://spoken-tutorial.org

National Mission on Education through ICT
http://sakshat.ac.in

Kaushik Datta & Priyam Nayak
IIT Bombay

6 March 2018

Learning Objectives

In this tutorial, we will learn to:

Learning Objectives

In this tutorial, we will learn to:

- **Simulate an Absorption Column**

Learning Objectives

In this tutorial, we will learn to:

- **Simulate an Absorption Column**
- **Use ChemSep column as CAPE-OPEN Unit Operation**

Learning Objectives

In this tutorial, we will learn to:

- **Simulate an Absorption Column**
- **Use ChemSep column as CAPE-OPEN Unit Operation**
- **Specify Thermodynamics in ChemSep column**

Learning Objectives

In this tutorial, we will learn to:

- **Simulate an Absorption Column**
- **Use ChemSep column as CAPE-OPEN Unit Operation**
- **Specify Thermodynamics in ChemSep column**
- **Specify Pressure profiles & Method in ChemSep column**

System Requirement

System Requirement

- **DWSIM v 5.2 (Classic UI)**

System Requirement

- **DWSIM v 5.2 (Classic UI)**
- **Windows 10**

System Requirement

- DWSIM v 5.2 (Classic UI)
- Windows 10
- Any OS: Linux, Mac OS X or FOSSEE OS on ARM

Prerequisites

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 streams and specify their properties**

Prerequisite Tutorials and Files

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

Streams and Inlet stream conditions

Streams	Absorbent Oil, Feed Gas	
	Absorbent Oil	Feed Gas
Mass Flow	12750 kg/h	11840 kg/h
Temperature	32 °C	41 °C
Pressure	28 bar	28 bar

Property Package and Inlet stream conditions

Package	Peng-Robinson	
	Absorbent Oil	Feed Gas
Mole Fraction	$x_{CH_4} = 0$ $x_{C_2H_6} = 0$ $x_{C_3H_8} = 0$ $x_{C_4H_{10}} = 0$ $x_{C_5H_{12}} = 0$ $x_{C_{12}H_{26}} = 1$	$x_{CH_4} = 0.2$ $x_{C_2H_6} = 0.4625$ $x_{C_3H_8} = 0.3$ $x_{C_4H_{10}} = 0.0315$ $x_{C_5H_{12}} = 0.00625$ $x_{C_{12}H_{26}} = 0$

Summary

In this tutorial, we have learnt to:

- Simulate an Absorption Column
- Use ChemSep column as CAPE-OPEN Unit Operation
- Specify Thermodynamics in ChemSep column
- Specify Pressure profiles & Method in ChemSep column

Assignment

Inlet Streams	Absorbent, Gas Inlet	
Compounds	Pure H_2O	Acetone, N_2, O_2
Mass Flow (lbmol/h)	176.4	Acetone- 3.53 Nitrogen 136.55 Oxygen- 36.3
Temperature	80 °F	80 °F
Pressure	14.7 psia	14.7 psia

Assignment

Property Package	NRTL
Number of Stages	12
Column Presure	14.7 psia

About the Spoken Tutorial Project

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

About the Spoken Tutorial Project

- Watch the video available at http://spoken-tutorial.org/What_is_a_Spoken_Tutorial
- 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**

Forum for specific questions

- Do you have questions in this Spoken Tutorial?
- Please visit http://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 flow sheets**
- **We give honorarium and certificates for those who do this**
- **For more details, please visit this site http://dwsim.fossee.in/flowsheeting-project**

Textbook Companion Project

- The FOSSEE team coordinates coding of solved examples of popular books
- We give honorarium and certificates for those who do this
- For more details, please visit this site http://dwsim.fossee.in/textbook-companion-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 http://dwsim.fossee.in/lab-migration-project**

Acknowledgements

- **Spoken Tutorial and FOSSEE projects are funded by NMEICT, MHRD, Government of India**

Thanks

- **Thanks for joining**