# Creating Reaction Set with Multiple Reactions

**Spoken Tutorial Project**
**https://spoken-tutorial.org**

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

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- **Copy and Reuse a Conversion Reaction**
- **Use Create and Connect feature to auto create and connect Material Streams**

# System Requirement

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- **Any OS: Linux, Mac OS X or FOSSEE OS on ARM**

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- **Add Conversion Reaction**
- **Specify Conversion Reactor parameters**

# 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**

- **Multiple-Reaction** file used in the tutorial is provided as a Code file on this tutorial page

# Code Files

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- **Make a copy and then use it while practising**

# Package and Inlet Conditions

| Package | Chao-Seader | |
|---------|-------------|---|
| **Inlet Stream (S-01)** | **Molar Flow** | 40 kg/s |
| | **Temperature** | 650 K |
| | **Pressure** | 2026500 Pa |
| | **Mole fractions** | Ethylene: 0.28 |
| | | Benzene: 0.72 |
| | | Ethylbenzene: 0 |
| | | P-diethylbenzene: 0 |

# Package and Inlet Conditions

| Package | Chao-Seader | |
|---|---|---|
| Inlet Stream (S-03) | Molar Flow | 15 kg/s |
| | Temperature | 410 K |
| | Pressure | 2026500 Pa |
| | Mole fractions | Ethylene: 0 |
| | | Benzene: 0 |
| | | Ethylbenzene: 0.018 |
| | | P-diethylbenzene: 0.982 |

- **Reaction-1**

  $$C_2H_4 + C_6H_6 \rightleftharpoons C_8H_{10}$$

  $$X_{C_2H_4} = 73.5\%$$

- **Reaction-2**

  $$2C_2H_4 + C_6H_6 \rightleftharpoons C_{10}H_{14}$$
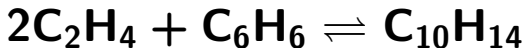
  $$X_{C_2H_4} = 25.5\%$$

- **Reaction-3**

  $$C_6H_6 + C_{10}H_{14} \rightleftharpoons 2C_8H_{10}$$
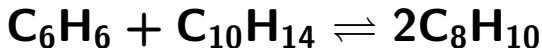
  $$X_{C_{10}H_{14}} = 22.13\%$$

- **Reaction-4**

  $$C_2H_4 + C_6H_6 \rightleftharpoons C_8H_{10}$$
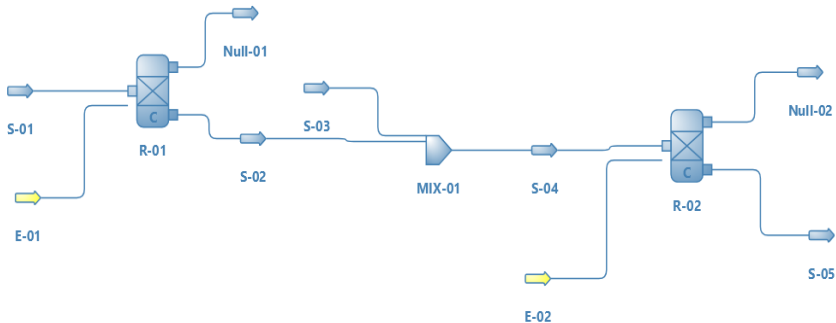
  $$X_{C_2H_4} = 97\%$$

# Conversion Reactor Conditions

- **All Reactions are mixed phase**
- **R-01**
  **Reaction-1** and **Reaction-2** takes place at 434 K
- **R-02**
  **Reaction-3** and **Reaction-4** takes place at 432 K

# Display Flowsheet

| Compounds | Mass Flow rate |
|:---:|:---:|
| Ethylene | 0.001 kg/s |
| Benzene | 20.903 kg/s |
| Ethylbenzene | 20.252 kg/s |
| P-diethylbenzene | 13.842 kg/s |

- **Create Reaction Set with Multiple Reactions**
- **Copy and Reuse a Conversion Reaction**
- **Use Create and Connect feature to auto create and connect Material Streams**

- Which reactions are added in the **Default Set** available under the **Reaction Sets**?

- What happens when **Calculation Mode** for R-01 is set to **Isothermal**?

- What happens when **Calculation Mode** for R-02 is set to **Adiabatic**?

- What happens when **Phase** for the Reactions is changed to **Liquid**?

# About 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**

# Acknowledgements

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

- **Thanks for joining**