



## Chemwork

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### External reflux ratio and actual number of trays in a fractionation column i

**Reza Modanloo**

Senior Process Engineer /Open to new opportunities  
Top Contributor

Determination of actual number of trays and optimum feed tray stage by short cut column is the First step in process design of a fractionation column by HYSYS. (column spec are given)

The problem is we have to give external reflux ratio besides column specs in short cut calculation so that the actual number of trays are determined. however we increase the external reflux ratio, number of trays decreases but energy consumption of column increases on the

other hand (bigger reboiler and condenser)

Does anybody have a practical experience on this issue to give me some advice?

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**Mohommed Ilyas Mullani**

Process Engineer at Almeer Technical Services  
Top Contributor

Mohommed Ilyas

while performing simulation in hysys it shows a section degrees of freedom and it should be zero for a stable system. when we enter no. of trays or reflux ratio we make DOF as zero. its obvious that stages will reduce as we increase the reflux ratio. the better way is to fix the component composition and simulate the system.

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**Hooman Tabaraei**

Specialist Process Engineer (MICHEM, CEng)

Hooman

Dear Reza,

First step in distillation column sizing by HYSYS, is to estimate the temperature and pressure of condenser and reboiler of column as per the required quality of light and heavy components in top and bottom of column, which can be done by "SPLITTER". And at the second stage you can use "SHORT CUT DISTILLATION COLUMN" to calculate no. trays and feed tray as per specified temperature and pressure of condenser and reboiler of column.

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**Reza Modanloo**

Senior Process Engineer /Open to new opportunities  
Top Contributor

Reza

Dear Homan,

could you please explain a bit more about estimating Temperature and Pressure by SPLITTE? for instance suppose we want to separate propane and butane from each other (lets say feed stream just contains these two items).all we have are : Feed composition,Feed process conditions (T and P), specification of Overhead and bottom products (heavy and light key)

So which are out entry parameters in Connection,Parameters and splits tabs in SPLITTER ? to get estimated T and P from splitter result?

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**Reza Modanloo**

Senior Process Engineer /Open to new opportunities

Top Contributor

Reza

Dear Mohommed,

Thanks for your explanations.the issue is for simulating a distillation column you have to enter the number of trays in the first page(it is compulsory).the number of trays is estimated in SHORTCUT COLUMN. in shortcut column we have to enter "External reflux ratio" which is not known to us yet.

As i read in some text, the best value for External rate of ration is  $1.2 \times$  minimum reflux ratio. minimum reflux ratio is given by short cut column.

if you have any experience in this regard,please let us know

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**Wilfredo Garcia**

Process Specialist at Ecopetrol

Wilfredo

Dear Reza,

I have some papers talking about this subject, please drop me an email to wilfredo.garcia@btinternet.com and I'll submit it to your inbox.

Cheers,

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**Reza Modanloo**

Senior Process Engineer /Open to new opportunities

Top Contributor

Reza

Hi Wilfredo,

my email address is :reza\_modanlou@yahoo.com

waiting to receive your papers

regards

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**Hooman Tabaraei**

Specialist Process Engineer (MIChemE, CEng)

Hooman

Hi Reza,

After selection of SPLITTER, you define 100% recovery for C4 and 0% for C3. then you define pressure for products, HYSYS then estimate relevant temperatures. one thing more, never forget to select energy (heat) stream for your column.

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