Fenske Distribution of a Non-Key Component

Split of any component between distillate and bottoms at total reflux from Fenske minimum stages and the heavy-key split, Perry's Eq. (13-31).

Method: Perry's Chemical Engineers' Handbook; 9th ed. (McGraw-Hill, 2019); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Minimum stages	8.0000	
Volatility of the component relative to the heavy key	3.0000	
Heavy-key split distillate/bottoms	0.050000	
Component in the feed	10.000	kmol/h

Calculated results

Parameter	Value	Unit
Component split distillate/bottoms	328.05	
In the distillate	9.9696	kmol/h
In the bottoms	0.030391	kmol/h
Recovered in the distillate	99.696	%

Formula and method

$$\left(\frac{d}{b}\right)_i = \alpha_i^{N_{min}} \left(\frac{d}{b}\right)_{HK}, \quad d_i = f_i \frac{(d/b)_i}{1+(d/b)_i}$$

Variables

N_{min}	Minimum stages	-
α_i	Volatility of the component relative to the heavy key	-
$(d/b)_{HK}$	Heavy-key split distillate/bottoms	-
f_i	Component in the feed	mol/s
$(d/b)_i$	Component split distillate/bottoms	-
d_i	In the distillate	mol/s
b_i	In the bottoms	mol/s
d_i/f_i	Recovered in the distillate	-

Method and standards

Perry's Eq. (13-31) with the heavy key as reference.

Assumptions and limits

- Constant α; total reflux distribution.

References

- Perry's Chemical Engineers' Handbook
- 9th ed. (McGraw-Hill, 2019)
- sec. 13 (distillation)
- Eq. (13-31)

Report details

Report reference	FCC-JKH8-FNMG (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Fenske Distribution of a Non-Key Component
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Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/chemical/separation/fenske-component-distribution

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.