Flash Point Estimate from Vapour Pressure (Leslie–Geniesse)

Closed-cup flash point estimate of an organic liquid: the temperature where its vapour pressure equals 1 atm/(8β), with β from its C, H, O, S and halogen atoms.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Carbon atoms	6.0000	
Hydrogen atoms	6.0000	
Oxygen atoms	1.0000	
Sulfur and silicon atoms	0	
Halogen atoms	0	
Vapour pressure A (ln p/Pa = A + B/T + C ln T + D T^E)	95.444	
B (K)	-10,113	
C	-10.090	
D	6.7603e-18	
E	6.0000	

Calculated results

Parameter	Value	Unit
Moles of O_2 per mole of fuel	7.0000	
Vapour pressure at the flash point	1.8094	kPa
Flash point	77.689	°C
Stoichiometric vapour concentration in air	2.9060	%

Notes for this case

- Perry's: about 4 K. Measured closed-cup values (ASTM D 56, D 93) govern classification. Screening estimate only, not a safety study or a basis for protective design.
- The vapour-pressure equation is used as entered; make sure the flash point lies inside the temperature range it was fitted for.

Formula and method

$$p^*(T_{FP}) = \frac{1\ \text{atm}}{8\beta}, \quad \beta = N_C + N_{Si} + N_S + \frac{N_H - N_X - 2N_O}{4}, \quad C_{st} = \frac{1}{1 + 4.773\beta}$$

Variables

N_C	Carbon atoms	-
N_H	Hydrogen atoms	-
N_O	Oxygen atoms	-
$N_S + N_{Si}$	Sulfur and silicon atoms	-
N_X	Halogen atoms	-
A	Vapour pressure A (ln p/Pa = A + B/T + C ln T + D T^E)	-
B	B (K)	-
C	C	-
D	D	-
E	E	-

β	Moles of O_2 per mole of fuel	-
p^*	Vapour pressure at the flash point	Pa
T_{FP}	Flash point	K
C_{st}	Stoichiometric vapour concentration in air	-

Method and standards

Leslie–Geniesse with the user's vapour-pressure equation.

Assumptions and limits

- Organic compounds; closed cup.
- The vapour-pressure equation's own temperature range is not an input, so the result is not checked against it: confirm the flash point lies inside it.

References

- Perry's Chemical Engineers' Handbook
- 9th ed. (McGraw-Hill, 2019)
- sec. 2
- Eqs. (2-122)
- (2-123) and (2-128) (Leslie and Geniesse, International Critical Tables) with the phenol example

Report details

Report reference	FCC-GM8Z-FKDV (the same inputs always give the same reference)
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Calculator	Flash Point Estimate from Vapour Pressure (Leslie–Geniesse)
Method last reviewed	13 November 2026
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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/process-safety/flash-point-leslie-geniesse

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.