Viscosity Blending of Oils (Refutas Index)

Kinematic viscosity of a blend of up to three oils by the Refutas viscosity blending number, and the share of a thinner oil needed for a target viscosity.

Method: Refutas viscosity blending number

Input parameters

Unit system: SI

Parameter	Value	Unit
Viscosity of oil 1	380.00	cSt
Mass share of oil 1	70.000	%
Viscosity of oil 2	3.0000	cSt
Mass share of oil 2	30.000	%
Viscosity of oil 3 (any value if its share is 0)	30.000	cSt
Target viscosity for a blend of oils 1 and 2	180.00	cSt

Calculated results

Parameter	Value	Unit
Blending number of oil 1	36.876	
Blending number of oil 2	15.174	
Blending number of the blend	30.365	
Viscosity of the blend	43.756	cSt
Share of oil 2 for the target (blend of 1 and 2)	8.9699	%

Notes for this case

• Viscosities do not blend linearly: a little thin oil lowers the viscosity of a heavy oil a lot. The Refutas method turns each viscosity (cSt, at one common temperature) into a blending number VBN = 14.534 ln[ln(v + 0.8)] + 10.975 that does blend linearly by mass share, then turns the blend's number back into a viscosity. All viscosities must be at the same temperature.

Formula and method

$$VBN = 14.534 \ln\left[\ln(\nu + 0.8)\right] + 10.975, \quad VBN_b = \sum w_i VBN_i, \quad \nu_b = e^{e^{(VBN_b - 10.975)/14.534}} - 0.8$$

Variables

ν_1	Viscosity of oil 1	m²/s
w_1	Mass share of oil 1	-
ν_2	Viscosity of oil 2	m²/s
w_2	Mass share of oil 2	-
ν_3	Viscosity of oil 3 (any value if its share is 0)	m²/s
ν_t	Target viscosity for a blend of oils 1 and 2	m²/s
VBN_1	Blending number of oil 1	-
VBN_2	Blending number of oil 2	-
VBN	Blending number of the blend	-
ν_b	Viscosity of the blend	m²/s
$w_{2,t}$	Share of oil 2 for the target (blend of 1 and 2)	-

Method and standards

Refutas blending.

Assumptions and limits

- Viscosities in cSt at a common temperature; mass shares.

References

Refutas viscosity blending number

Report details

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Release checks	3 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/physical-properties/refutas-viscosity-blending

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.