

# Scoring of the Eleventh Industrial Fluid Properties Simulation Challenge: The Temperature Dependence of Viscosity for 1,1 Diphenylethane at High Pressure

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## Scoring Function

Maximum total points = 100

Table 1. Viscosities at for 1,1 diphenylethane in mPa·s.

$p$ / MPa	37.8°C	60°C	98.9°C
600	33078	1040	
700	991934	7506	
800		89541	496

Temperature-Viscosity Coefficient,  $\bar{\beta}(T_1, T_2, p) = \frac{\ln(\eta(T_1, p)/\eta(T_2, p))}{T_2 - T_1}$ ,  $T_1 < T_2$

Table 2. Temperature-Viscosity Coefficients

	$\bar{\beta}(T_1, T_2, p) / \text{K}^{-1}$	
$p$ / MPa	37.8°C, 60.0°C	60.0°C, 98.9°C
600	0.16	
700	0.22	
800		0.13

Table 3. Scoring Parameters

p / MPa	T / °C	Category	Tolerance	Full Points
600	37.8	Viscosity	20%	6
600	60	Viscosity	20%	6
700	37.8	Viscosity	20%	7
700	60	Viscosity	20%	7
800	60	Viscosity	20%	8
800	98.9	Viscosity	20%	8
600	37.8, 60	$\bar{\beta}(T_1, T_2, p)$	10%	16
700	37.8, 60	$\bar{\beta}(T_1, T_2, p)$	10%	21
800	60, 98.9	$\bar{\beta}(T_1, T_2, p)$	10%	21

Relative Error is defined as  $\varepsilon = \frac{X_{MD}}{X_{exp}} - 1$ . Full points are awarded for  $|\varepsilon| < t$  where  $t$  is a tolerance.

The points awarded for each of the 9 categories is  $F \times$  Full Points where

if  $|\varepsilon| < t$ , then  $E = 0$ . Else if  $\varepsilon > t$ , then  $E = \varepsilon - t$  and if  $\varepsilon < -t$ , then  $E = \varepsilon + t$ .

$$F = \frac{1}{\exp(sE)} \text{ where } s = 4.$$

