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solubility parameter, δ

Parameter used in predicting the solubility of non-electrolytes (including polymers) in a given solvent.
For a substance B,

$$\delta_{\mathrm{B}} = \left(\frac{\Delta_{\mathrm{vap}}E_{\mathrm{m,B}}}{V_{\mathrm{m,B}}}\right)^{1/2}$$

where $\Delta_{\mathrm{vap}}E_{\mathrm{m,B}}$ is the molar energy of vaporization at zero pressure and $V_{\mathrm{m,B}}$ is the molar volume.
Notes:

1. For a substance of low molecular weight, the value of the solubility parameter can be estimated most reliably from the enthalpy of vaporization and the molar volume.
2. The solubility of a substance B can be related to the square of the difference between the solubility parameters for supercooled liquid B and solvent at a given temperature, with appropriate allowances for entropy of mixing. Thus, a value can be estimated from the solubility of the solid in a series of solvents of known solubility parameter. For a polymer, it is usually taken to be the value of the solubility parameter of the solvent producing the solution with maximum intrinsic viscosity or maximum swelling of a network of the polymer. See J.H. Hildebrand, R.L.Scott, The Solubility of Nonelectrolytes, 3rd ed., Reinhold Publishing (1950); Dover Publications (1964), Chap. VII, p.129; Chap. XXIII, for the original definition, theory, and extensive examples.
3. The SI units are $\mathrm{Pa}^{1/2} = \mathrm{J}^{1/2}\,\mathrm{m}^{-3/2}$, but units used frequently are $(\mu\mathrm{Pa})^{1/2} = (\mathrm{J\,cm^{-3}})^{1/2}$ or $(\mathrm{cal\,cm^{-3}})^{1/2}$, where $1\ (\mathrm{J\,cm^{-3}})^{1/2} \approx 2.045\ (\mathrm{cal\,cm^{-3}})^{1/2}$. The unit calorie is discouraged as obsolete.

Source:
PAC, 2008, *80*, 233 *(Glossary of terms related to solubility (IUPAC Recommendations 2008))* on page 264

