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SUPPORTING INFORMATION

The Role of Solvent Cohesion in Nonpolar Solvation

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Figure S1. Determination of $P_i$ for hexadecane by extrapolation from the data for other linear alkanes.

![Graph showing the determination of $P_i$ for hexadecane.]

Table S1. Correlation coefficients ($R^2$) for plots of the Gibbs energy of transfer of a series of nonpolar solutes from the gas phase to a range of solvents versus solvent cohesion expressed as a linear combination of $P_i$ and $ced$ for different values of $\%ced$. The last line shows the $\%ced$ for which the best correlation is obtained.

<table>
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<th>$%ced$</th>
<th>He</th>
<th>Ne</th>
<th>Ar</th>
<th>Kr</th>
<th>Xe</th>
<th>Rn</th>
<th>H2</th>
<th>Me</th>
<th>Et</th>
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<td>0.642</td>
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| best fit (% ced) | 16.3 | 17.5 | 22  | 26  | 35  | 55  | 19  | 33  | 45  | 50  | 53  | 58  | 53  | 52  | 63  |

It appears that the $\%ced$ for the best fit seems to level off for the linear alkanes. This is most likely a result of the $\%ced$ approaching the limit for solvation of a methylene unit. It is also noteworthy that for these solutes the correlation coefficients show only minor changes in the range of 50-100 $\%ced$. This is at least to some extent an artefact of the isolated position of water which allows it to exert a dominant influence on the linear regression analysis. Repeating the fitting procedure excluding the data for water gave clearer defined maxima in the relation between correlation coefficient and $\%ced$. The position of the maxima is not significantly affected by excluding water.
**Figure S2.** Gibbs energies of transfer of the noble gases, hydrogen and linear alkanes from the gas phase to different solvents at 298 K as a function of solvent cohesion, as quantified a linear combination of the internal pressure ($P_i$) and the cohesive energy density ($ced$) (in cal/cm$^3$). Standard states: solute(ideal gas, 1M) $\rightarrow$ solute(ideal solution, 1M). The solvents include: n-hexadecane, n-decane, n-hexane, cyclohexane, carbontetrachloride, diethylether, toluene, benzene, ethyl acetate, methyl acetate, butanone, acetone, DMF, acetonitrile, propylene carbonate, DMSO, isobutyl alcohol, 1-butanol, 2-propanol, 1-propanol, ethanol, methanol, ethylene glycol and water. Data points for water are circled. The insets in the graphs of the smaller solutes show the corresponding correlations with $ced$ only.

**Figure S3.** Re-analysis of the data in Figure 2 (main text) in which the data for water has been left out of the linear regression.
**Figure S4.** Re-analysis of the data in Figure 4 (main text) in which the data for water has been left out of the linear regression.

![Graph showing re-analysis of data](image)

**References:**