

Guanidine-equipped thiacalix[4]arenes: synthesis, interaction with DNA and aggregation properties

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Experimental

Reagents

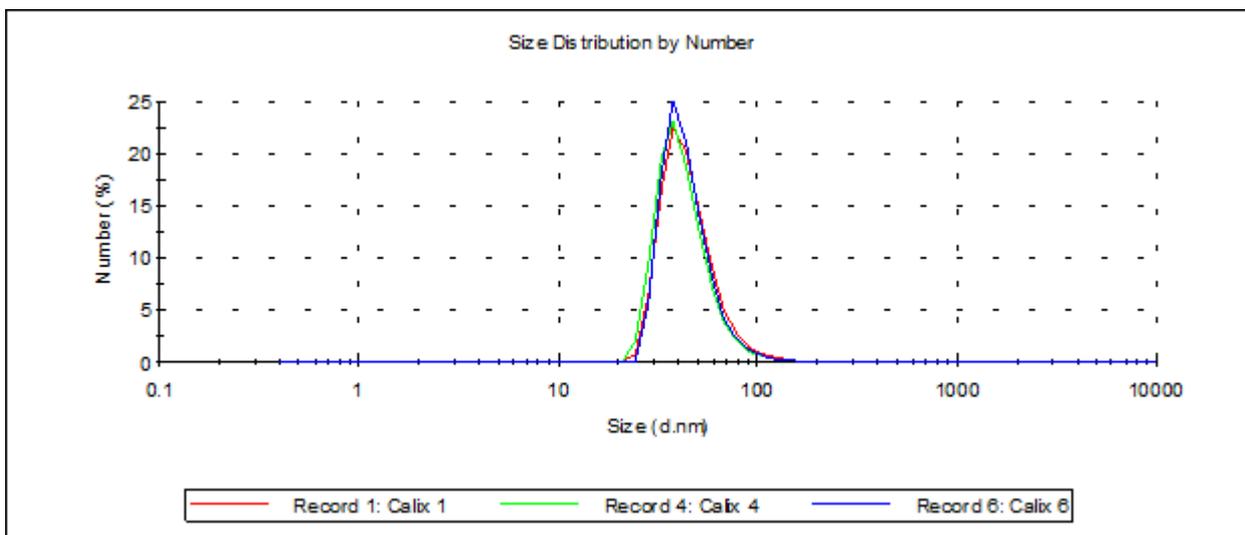
Salmon sperm DNA (Fluka Biochemika; protein content <5%), calf thymus DNA sodium salt (Sigma; sodium content 6%), Tris-HCl (Sigma), ethidium bromide were purchased from Fluka Biochemika, Sigma Chem. Co., Acros Organics and used as received. Concentration of DNA solution was determined to be 4.0×10^{-6} mol dm⁻³ by absorption spectrometry, using the absorptivity $\epsilon_{260} = 6600$ mol⁻¹ cm⁻¹. Purity of DNA was checked by monitoring the ratio of the absorbance at 260 to that at 280 nm. The solution gave a ratio of A₂₆₀/A₂₈₀ > 1.8, indicating that DNA was sufficiently free from protein.

Apparatus

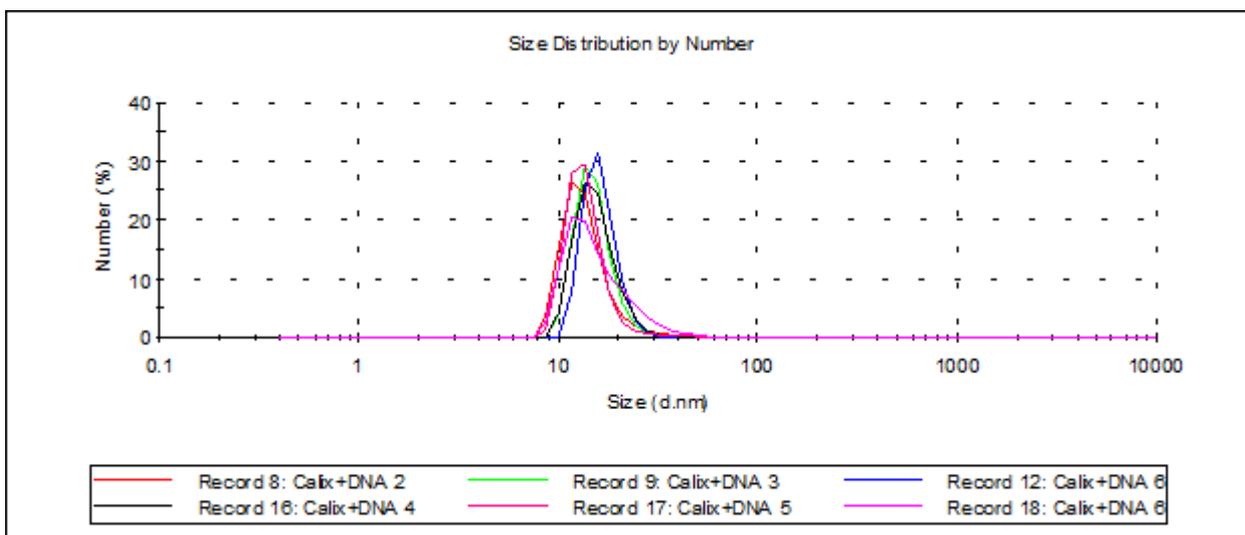
Fluorescence spectra were recorded on the fluorescence spectrometer Fluorolog 3 (Horiba Jobin Yvon). Excitation wavelength of 500 nm and a scanning range for emission wavelengths from 550 - 700 nm was chosen. Excitation and emission slits were 3 nm. Quartz cuvettes with optical path length of 2 mm were used. Emission spectra were automatically adjustment by the program Fluorescence.

The size distribution of particles formed as a result of self-assembly of thiacalix[4]arene or its aggregation with salmon sperm DNA at 20 °C was determined by dynamic light scattering on the nanoparticle size analyzer Zetasizer Nano ZS (Malvern) using polystyrene cuvettes. The analyzer is equipped with a 4 mW He-Ne laser operating at a wavelength of 633 nm. Measurements were carried out at an angle of 173° with automatic determination of position of measurement inside the cuvettes. Results were processed using the DTS Nano software.

Dynamic light scattering measurements



Size distribution by number of nanoparticles of thiacalixarene **7** ($1 \cdot 10^{-4}$ M) in Tris-HCl buffer solution (pH=7.5).



Size distribution by number of nanoparticles of thiacalixarene **7** ($1 \cdot 10^{-4}$ M) with salmon sperm DNA ($4 \cdot 10^{-6}$ M) in Tris-HCl buffer solution (pH=7.5).