

Nanoscale Aggregation Properties of Neuroprotective Carboxyfullerene

Malonic acid trisadduct, C₆₀[C(COOH)₂]₃ or C3 and dendrimer Dendro[60]fullerene or DF1 which are highly water soluble structures are actively being pursued as prime drug candidates for various neurological diseases, as well as for possible lifespan extension.

Complete characterization of any new drug candidate is fundamental to its success, and a key component of any characterization is an accurate assessment of its aggregation state. Compounds can aggregate as a function of temperature, pH, ionic strength, and concentration. Even small degrees of aggregation can be significant, since they cause conformational shifts in molecular structure which can alter the function of a therapeutic agent.

Using dynamic light scattering (DLS) the present work demonstrates that both C3 (Figure 1) and DF1 (Figure 2) exhibits strong aggregation behavior in aqueous solution in vitro having aggregate sizes between 35-50nm. Measurements were conducted on a DAWN EOS instrument equipped with a 30mW GaAs laser at $\lambda = 690$ nm, with a scattering angle fixed at 90° and a temperature of 25°C. Data analysis and size distribution computations were performed using the DYNALS regularization algorithm and a multi- τ digital recorder (WyattQELS).

The aggregation behavior of these compounds may have ramifications about on-going studies of the compounds as antioxidants against biologically-reactive oxygen species such as superoxide anion, hydrogen peroxide, and hydroxyl radical. Therefore, using DLS and SLS, our current studies continue to probe the influence of aggregate size and structure on the catalytic properties of C3 and DF1.

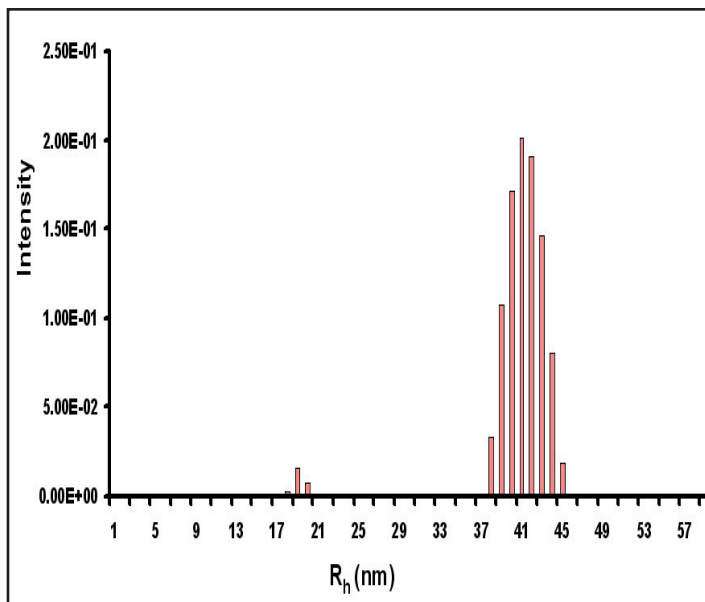


Figure 1. Intensity size distributions for C3 in aqueous solution. (Conc. = 1 mg/ml, pH = 9.0 and Temp = 25 °C)

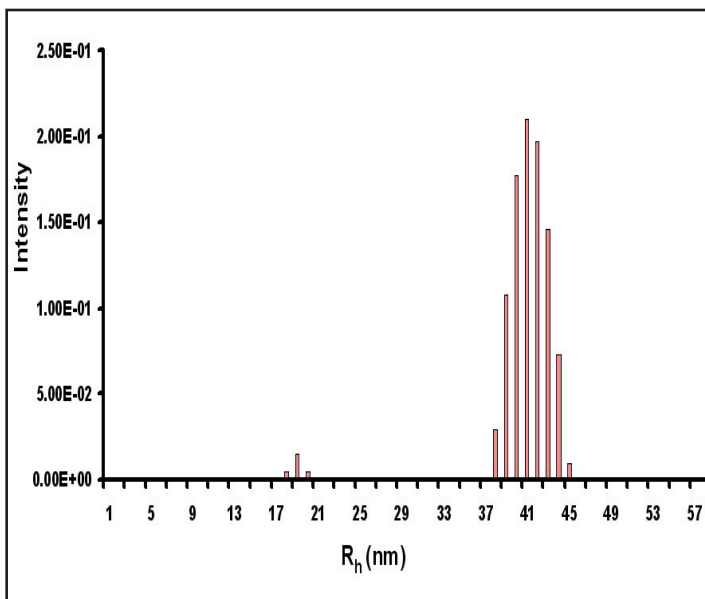


Figure 2. Intensity size distributions for DF1 in aqueous solution. (Conc. = 1 mg/ml, pH = 9.0 and Temp = 25 °C)

