

### Equilibration of samples

We performed an osmotic stress experiment to investigate how long it takes for the DNA- $C_4K_{12}$  complexes to equilibrate against a PEG solution. We plotted the distances between the DNA backbone as a function of the number of days the sample has been equilibrated (Figure 1). Using SAXS We found that intermolecular spacing remain constant, for different PEG concentration, for  $\sim 1$  month period. In Figure 1 we checked the equilibration time for two different PEG concentrations, namely 15 and 25wt% of PEG. Importantly, after 1 day the DNA- $C_4K_{12}$  appeared to reach equilibrium.

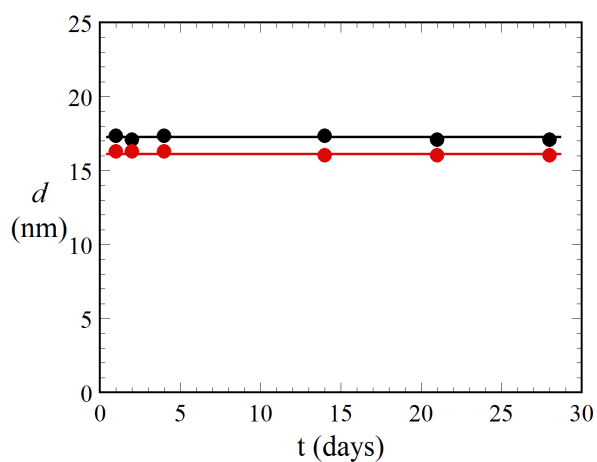


Figure 1: The distance between the DNA-bottlebrushes as a function of the number of days the samples were equilibrated in a PEG solution. The black data point represent samples equilibrated against 15 wt% and the red data points were equilibrated against 25 wt% of 20 kDa PEG solution. Each sample equilibrated to a 25 wt% PEG solution became birefringent and all the samples equilibrated to a 15 wt% PEG solution were not birefringent.