ChE 891/2

Experimental Methods in Nanotechnology

Homework 6
Due 27 February 2008

1. Below are static light scattering data, which are also given in an Excel spreadsheet on the web page. Make a Zimm plot and perform the analysis to determine R_g, A_2 and M. Make the graph with a positive and negative value of the constant $(\sin(\theta/2)^2$ + constant × c) to see how it affects the graph

Data: A.I. Krasna, Coll Inter Sci 39 (1972) 63: Calf thymus DNA in aqueous solution

K (cm^2-g^{-2}) 3.63E-07

$R_H \times 10^5$ (cm^{-1})

	c×10^6 (g/cc)			
H(deg)	**20.6**	**41.4**	**62**	**82.5**
26	2.47	4.80	6.94	8.75
30	2.06	4.02	5.83	7.67
34	1.77	3.39	4.84	6.44
38	1.75	2.98	4.28	5.61
42	1.38	2.57	3.84	4.87
50	1.01	1.90	2.91	3.71
60	0.76	1.45	2.23	2.89

2. Kotlarchyk and Chen give the intensity for polydisperse spheres in equations 17, 25 and 27 of their manuscript (M. Kotlarchyk and S. H. Chen, *J. Chem. Phys.*, 1983, **79**, 2461-2469.). Plot the intensity versus dimensionless wave vector ($q \times a_n$) for various values of polydispersity index, assume the volume fraction, V_n and scattering length density contrast are all scaled as one. Determine the value of the intensity at zero wave vector and compare that to a monodisperse system.

3. Plot the form factor for spheres, disks, cylinders and Gaussian polymers on the same graph. Can you tell them apart? Is the form factor a large function of scatterer geometry?

Please give the references to any archival journal or book in your homework solution.