(72)

Major Exam CH740: S.T. in Chemical Engineering May9, 2007

Maximum Marks 80 + EC20 **Maximum Time: 2 hr**

Any confusion is deemed to be by design. In case of doubt choose the more difficult option. Give explanations for yes/No type answers to get any credit.

1. Which of the two forces, Electrostatic Double Layer or van der Waals, has faster decay for two charged flat plates submerged in water? Will the answer change if one talks about pair-potentials? **(4 + 4)**
2. What is a "Stern Layer"? Is it more stable than a physically adsorbed layer? Is it more stable than a chemically grafted layer? **(4 + 4 + 4)**
3. What is the source of Electrostatic double layer repulsion between two equally charged plates in water? State one method to reduce this repulsion. **(4 + 4)**
4. How can a regular crystal have more entropy than a liquid like arrangement? **(4)**
5. Identify at least four major players in stability of colloids. Discuss the relative importance of these as **(4 + 4 + 4 + 4)**
   a. size of the colloidal particles change
   b. number density of the colloidal particles change
   c. temperature of the colloid change

   (Hint: One of them is van der Waals interaction)
6. How does the structure of colloidal aggregates depend on the ratio between short and long-range forces? **(4)**
7. What is depletion attraction? Name the two necessary conditions for it to occur. **(4 + 4)**
8. Why should van der Waal forces always oppose the stability of colloids? **(4)**
9. How is elasticity of polymer chains different from that of the elasticity of solids? **(4)**
10. Name two reasons why certain polymers can never form crystalline structure. **(4)**
11. Why should the most probable dimension of polymer chains devoid of any intermolecular forces vary as square root of degree of polymerization? **(4)**
12. Name two strategies to prevent crystallization and form glasses instead. **(4)**

EC1. Describe a simple strategy to simulate for aggregation in molecules, which have intelligence. **[EC 20]**

"Best of luck"