Properties of Polymers Homework #1 Due on 01 May 2019

1. Show the structures of 5 major commodity polymers [PE, PP, PS, PVC, and PMMA] and 5 major engineering plastics [PET, PA66, POM, PPO, and PC].
2. Do Problem 1.1, 1.2, and 1.3 on p14 of the textbook.
3. Do Problem 10.1 and 10.3 on p268 of the textbook.
4. Do problems 13.1 and 13.2 on p307 of the textbook.
5. Do problems 14.1 and 14.2 on p340 of the textbook.
6. From the MALDI TOF MS spectrum of Figure 14.13(a) of p333 of the text book, estimate the M_n, M_w, and PDI of this sample.
7. Do problems 16.1 and 16.3 on p396 of the textbook.
8. Do problems 17.1, 17.3, 17.4, and 17.8 on p445 of the textbook.
9. Do problems 18.2, 18.3, and 18.4 on p464 of the textbook.
10. Write down the Flory-Huggins equation showing free energy change of mixing for solvent(1)/polymer(2) solution. Define every parameter.
11. There are several ways to define or describe theta condition. Give five [5] statements describing theta condition. Use only (your own) words: Do not use any symbol, equation, or drawing. For example, 'In the theta condition the solution behaves as an ideal solution' gets points: not $\Delta G_m = \Delta G_m(\text{ideal})$.
12. Comment on each of the following statements. Tell if the statement is true, true under some condition, or totally wrong. Give your reasoning also.
    (a) Polyethylene terephthalate, a semicrystalline polymer, does not form complete amorphous state.
    (b) There is no atactic vinyl polymer that can form semicrystalline state.
    (c) For a given polymer chain, its freely rotating chain is larger than the freely jointed chain.
    (d) For a given polymer chain, end-to-end distance calculated taking account of excluded volume effect is larger than that calculated by RIS model.
    (e) A polymer chain in its amorphous state has the same dimension as in its unperturbed state.