Polymeric Materials Homework assignment 2 Due on final exam day

[Final exam of 2015]

1. For polypropylene (PP) answer the following questions.
   (a) Property of PP is largely dependent on its II. What is II and how is it defined?
   (b) Compared with HDPE, PP is of higher Tg, of lower chemical stability, and less opaque. Explain why with the structure of PP and PE.
   (c) PP is ofen mentioned as the candidate for the 'one material approach.' Briefly explain the 'one material approach.'
   (d) The reason for (c) above is partly due to the modified PP. List two forms of modified PP and explain their characteristics.

2. Kraton, Viton, and Surlyn are the tradenames of elastomers, and are the copolymers of sytyrene-butadiene, VDF-HFP, and ethylene-MAA, respectively
   (a) One of the three is an ionomer. Tell which and explain the structure and property of that.
   (b) One of the three is an oil-resistant elastomer. Tell which and explain the structure and property of that.
   (c) One of the three is a TPE. Tell which and explain the structure and property of that.
   (d) Lycra and Hytrel are two more tradenames of TPEs. Choose one and explain the structure and property of that.

3. Answer the following questions regarding special applications of polymeric materials.
   (a1) What is the definition of nonlinear optical property, and where is it applied to?
   (a2) What is the structural characteristic of a polymer that has nonlinear optical property?
   (b1) What is the definition of piezoelectricity, and where is it applied to?
   (b2) What is the structural characteristic of a polymer that has piezoelectricity?
   (c1) What is the definition of photoconductivity, and where is it applied to?
   (c2) What is the structural characteristic of a polymer that has photoconductivity?
   (d1) What is the definition of stimuli-sensitive hydrogels, and where are they applied to?
   (d2) What is the structural characteristic of stimuli-sensitive hydrogels?
   (e1) What is the definition of shape-memory polymers, and where are they applied to?
   (e2) What is the structural characteristic of shape-memory polymers?

4. Explain the followings. Make your answer concise, preferrably to one sentence.
   (a) life-cycle assesment
   (b) Radlite technology

[Final exam of 2016]

1. For industrial polymers, answer the following questions.
   (a) BR, IR, and CR are the three diene rubbers. Spell out their name, and show the chemical structure.
   (b) SBR, NBR, and IIR are the modification of the above diene rubbers. Explain the structure, and also the purpose or result of the modification for each case.

(c) SBS, TPU, and TPO are TPEs. Spell out the abbreviations.
(d) How does a TPE work? In other words, explain how a TPE is an E, and a TPE a TP.
(e) For each of the three TPEs above, what structure behaves as the crosslinking point?

2. For high-temperature polymers, answer the following questions.
   (a) Thermal stability, heat resistance, and fire resistance are the characteristics of high-temperature polymers. What is the Korean words for the three?
   (b) Define and differentiate the three properties
   (c) What physical parameter would you measure for each of the three properties above? (For electrical conductivity you would measure specific resistivity)
   (d) [What is the structural requirement for each of the three properties above? (For electrical conductivity conjugated double bonds are required.)

3. For liquid crystalline polymers [LCPs], answer the following questions.
   (a) Thermotropic and lyotropic is the two hehavior of LCP. What are they?
   (b) There are three phases that LCPs show. Name and explain them.
   (c) Both of mesogen and spacer are required in the structure of LCP. Explain the structural feature of them, and also why they are required.
   (d) Explain the even-odd effect in LCP.

4. Answer the following questions regarding functional polymeric materials.
   (a) Differnetiate p-doping and n-doping.
   (b) Differentiate poitive and negative lithography.
   (c) Differnetiate piezoelectricity and pyroelectricity.
   (d) Differentiate polyelectrolyte and ion-exchange resin.
   (e) Differentiate dendrimers and hyperbranched polymers.

5. Answer the following questions.
   (a) Explain the mechanism how a temperature-sensitive hydrogel can be utilized in targeted drug delivery.
   (b) Explain the mechanism how a pH-sensitive hydrogel can be utilized in targeted drug delivery.
   (c) Explain how the glass-fiber composite technology is utilized in recycling of plastics.