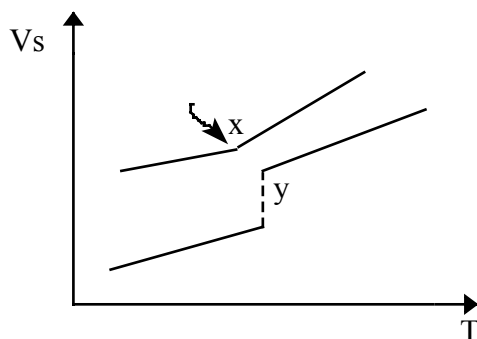


MULTIPLE CHOICE QUESTIONS

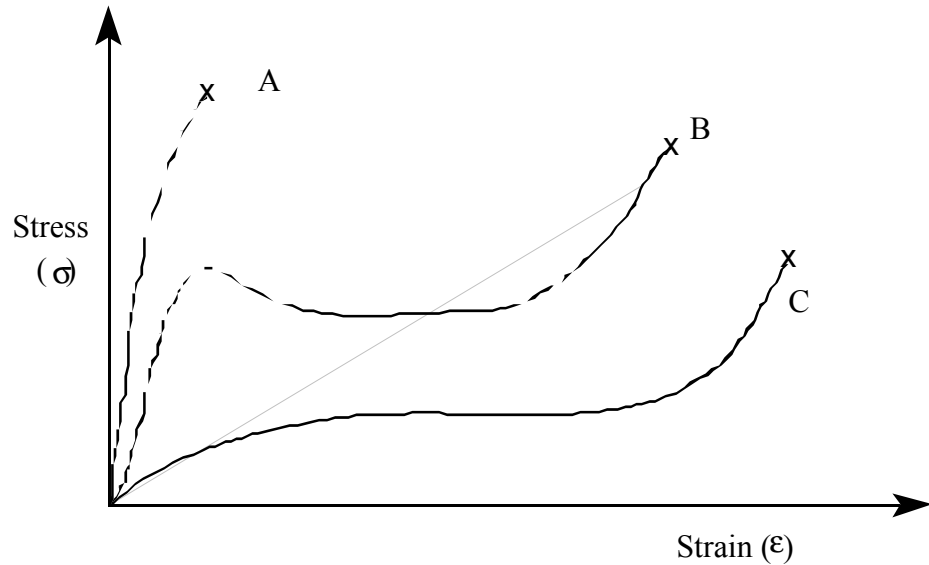
- Which of the following polymers would you expect to be most suitable for the production of a rubber car bumper guard?
 - Atactic polystyrene ($T_g \sim 100^\circ\text{C}$)
 - A random ethylene/propylene copolymer (50/50 composition) $T_g \sim -40^\circ\text{C}$.
 - Low density polyethylene.
 - High density polyethylene.
- Which of the polymers in question 1 would be most suitable for use as a flexible film wrap?
- Consider the two transitions from the “solid” to the liquid or rubbery state shown below on a plot of specific volume vs. temperature;



- The transition X is a T_g while transition Y is a crystalline melting point.
 - Y is the T_g while X is the T_m .
 - X and Y are melting points, but X is the T_m of a semi-crystalline material and Y is the T_m of an almost perfect crystal.
- Consider the following polymers;
 - $\text{—CH}_2\text{—CH}_2\text{—}$
 - $\text{—CH}_2\text{—CH—}$
|
 CH_3
 - $\text{—CH}_2\text{—CH—}$
|
 Cl
 - $\text{—CH}_2\text{—CH}_2\text{—O—}$

Which of these will have the highest Tg?

6. Which will have the lowest? (A-D of previous question)
7. Which of the following equations describes the dependence of melt viscosity on molecular weight for chains that are longer than the critical entanglement length.
 - A. $\eta = k(DP)^{1.0}$
 - B. $\eta = k(DP)^{2.0}$
 - C. $\eta = k(DP)^{3.4}$
 - D. $\eta = k(DP)^{2.4}$
 - E. $\eta = k(DP)^{3.0}$
8. Which of these describes the melt viscosity of short chains (< critical entanglement length)?
9. Melt fracture occurs
 - A. When chain molecular weight is too high
 - B. When a polymer is extruded too quickly
 - C. When a polymer is extruded too slowly
 - D. When an extruder is hit by a bloody great sledgehammer
 - E. When a polymer close to its Tg is extruded.
10. Consider the stress/strain diagrams shown below (next page). Which of these would most closely correspond to the mechanical behavior of Atactic polystyrene?
11. Consider the stress/strain diagrams shown below. Which of these would most closely correspond to the mechanical behavior of Isotactic polypropylene?
12. Consider the stress/strain diagrams shown below. Which of these would most closely correspond to the mechanical behavior of Natural rubber?



13. With increasing concentration of plasticizer the modulus of PVC

- A. increases
- B. decreases
- C. stays the same

14. You are handed four samples by some rotten, sadistic polymer science professor.

SAMPLE A is an opaque rectangular shaped film that has some flexibility and appears to be tough. (It did not break when one of the other students in your class suddenly went berserk and pounded it with a hammer).

SAMPLE B is transparent, fairly rigid and brittle

SAMPLE C is not transparent because it has been mixed with some gunk (a filler). However it stretches many times its original length, but does not return to its original length if it is held extended for anything more than a few seconds.

SAMPLE D appears identical to sample C but does return to its original length after stretching.

Which of these samples is most likely to be atactic polystyrene?

15. Which of the samples in question 14 is most likely to be a cis-1,4-polyisoprene (natural rubber) sample that has been treated with a cross-linking agent?

16. Which of the samples in question 14 is most likely to be a polyethylene (probably with a small degree of branching)?

17. PVC tubing is being used for transporting water. If organic solvents are run through this tubing it becomes stiff and somewhat brittle. This is because

- A) The solvent plasticizes the tubing, raising the T_g
- B) The solvent removes plasticizer, lowering the T_g
- C) The solvent removes plasticizer, raising the T_g