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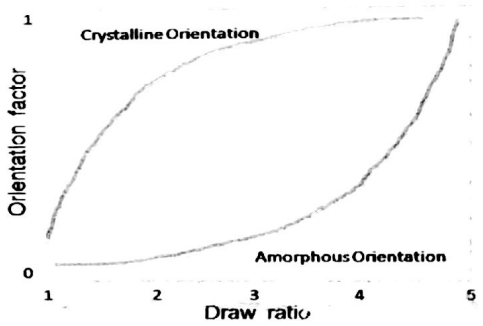
TXL212 Major exam Full Marks 30 Answer all

1. (a) In spun-drawn nylon-6 filament, the dye uptake and the diffusion coefficient are increased when heat-setting is carried out by steam. But these two parameters decrease if heat setting is done in dry condition. Explain why.
(b) Should the diffusion coefficient of dye increase or decrease if tension is applied to the fibre during heat-setting? 3+2

2. (a) How to calculate jet stretch ratio in wet spinning?
(b) Drawing of nylon-6 is usually carried out at room temperature. But as-spun nylon-6 fibres are kept some time for conditioning before taking it to drawing. Why? 1+4

3. (a) The crystalline orientation factor initially increases sharply, leveling off at higher draw ratio, whereas amorphous orientation factor initially rises very slowly and rises only at the highest draw ratios. Explain in terms of structures of polymer chains.

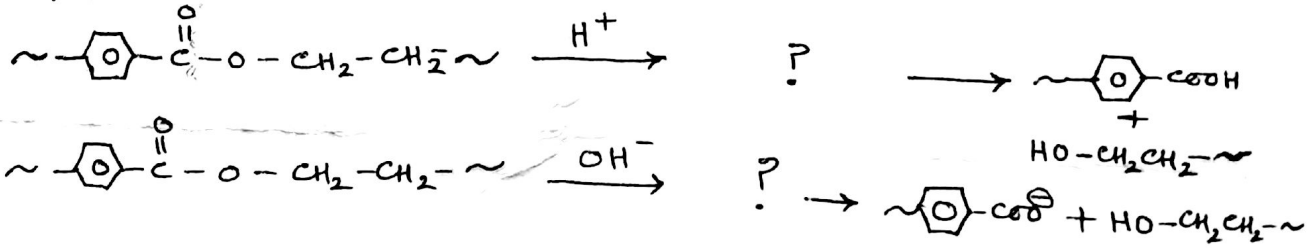


(b) Elaborate the structural changes in the stress-strain curve of a polymer in drawing stage during neck formation. 3+2

4. (a) It is very important to maintain moisture-free inert atmosphere during PET production. Explain with chemical reactions.

(b) Polycondensation reaction step for PET manufacturing is reversible. How the reaction is pushed forward for highest yield of polymer? 3+2

5. Draw the reaction mechanism showing chemical intermediated and final products for acid hydrolysis and alkaline of PET.



6. (a) Calculate the molecular weight of nylon-6, whose degree of polymerization is 3000.

(b) What is the purpose of xanthation step in viscose preparation? Explain with chemical reaction. 2+3