

1. (a) PET melt is thermally unstable. Above 150 degree C it undergoes degradation, and cause yellowing. Write the reaction.

(b) Mention with reasons, whether PET synthesis by DMT route is advantageous or TPA route?
5+3+2

(c) On which factors Die swell depends?

2. (a) What are the differences between small angle and wide angle x-ray diffraction?

(b) In solution spinning, how molecular weight of a polymer and temperature affect viscosity of the dope solution?
3+4+1+2

(c) Define Melt Flow index

(d) How molecular weight of a polymer can be estimated.

*elongation
→ viscosity to flow
relaxation time*

3. (a) What are the conditions of spinnability?

(b) What are the hazards related to viscose spinning process? Which other chemicals can be used to avoid that in advanced viscose manufacturing method.

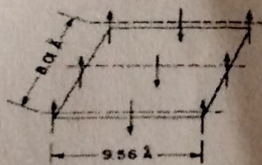
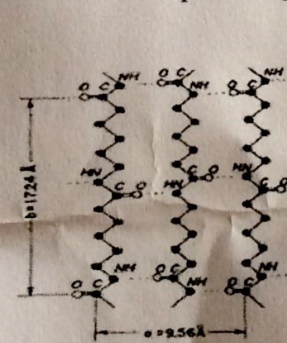
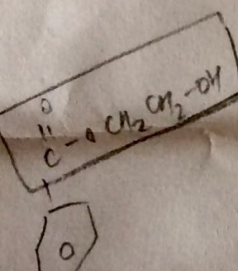
(c) Explain basic principle of Ramachandran's plot.

2+4+2+2

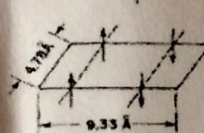
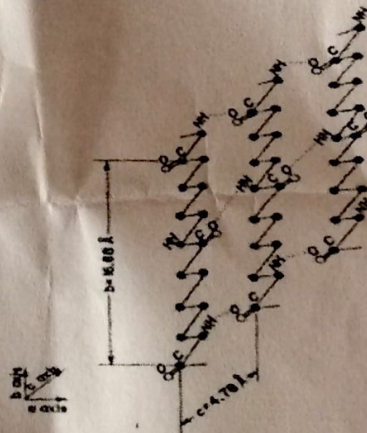
(d) What are the expected end-groups in PET? Justify your answer. What does an increase in -COOH groups with time, indicate?

4. (a) In the gland of silkworm 30% vol/vol fibroin protein remains without aggregation/precipitation. Which factors are responsible for solidification during fibre spinning?

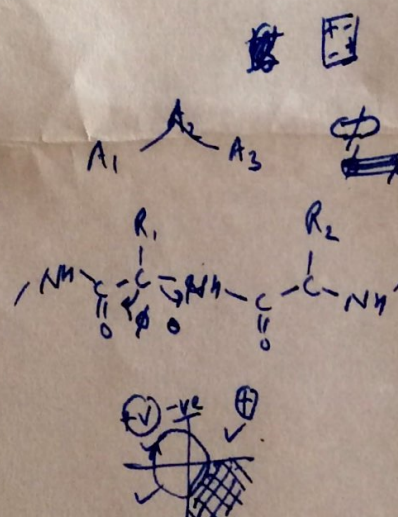
(b) How many theoretical conformations are possible for a polypeptide molecule having 25 amino acids? Allowed rotation for phi and psi angles -180 to +180 Consider whole angles.



(a)



(b)



(a) Is α -form of Nylon-6 and (b) is γ -form of Nylon-6. Based on the structural features mentioned in this diagram explain when these forms would be predominantly present during melt spinning and drawing stages of Nylon-6 preparation and why.

3+2+5