



Note: Answer Five questions, Q1 should be answered.

**Q1/**

A) Explain in details the polymer dissolving process in closed system, and indirect heating. Give a case study in details.

(8 marks)

B) Poly(benzylglutamate), PBLG, has partial specific volume is 0.791 ml/g and it dissolves in N,N'-dimethylformamide, DMF, which has a density of 0.944 g/ml (at typical room temperatures, this is close). If we have to make a solution of 0.254 g/ml concentration. Compute  $\phi_2$ , and  $w_2$ , if an amount of PBLG should be added to 0.18 ml of solvent.

(12 marks)

**Q2/**

A) Define catalyst, give properties of charcoal, and the manufacturing steps.

(10 marks)

B) Sketch, describe the following units, and give an application in a petrochemical process.

(Stripper, Flashing, Distillation, and Fluidized bed reactor)

(10 marks)

**Q3/** Explain the production of ethylene oxide, and sketch complete block diagram.

(20 marks)

**Q4/**

A) Discuss the time required to dissolve the polymer, and explain how to reduce dissolving time.

(10 marks)

B) Why must be careful to maintain the temperature closely when making solutions.

(10 marks)

**Q5/** Answer the following questions:

1. In Formaldehyde production, explain why light end stripper is used after absorber?
2. Suggest why pure formaldehyde is not produced in the process?
3. Since the boiling point of  $\text{CH}_3\text{Cl}$  and  $\text{CH}_2\text{Cl}_2$  are very close, what do you expect for the production of  $\text{CH}_3\text{Cl}$  from the first column?
4. In ethylene oxide production, why again another compressor is used before the stripper?
5. Sometimes, using a fluidized bed instead of packed bed reactor, explain why in detail.

(20 marks)

**Q6/** State the polymerization techniques. Explain in detail two methods of them.

(20 marks)

*Good Luck*