Dept of Biochemical Engineering and Biotechnology

BBL737 Instrumentation and Analytical Methods in Bioengineering

Minor-I (1st semester 2017-18)

Max Marks: 20 Time: 1 hour

Attempt all questions:

Q.1 What is the basic purpose of instrumentation in bioprocesses and which two physical parameters would be most important to monitor and why? 2

Q.2 a) While nucleic acids and proteins can be detected by UV spectrophotometry, can sugars be detected by this method? Why or why not? From what you have learned so far, which method would be best for detection of sugars and why? 1 + 2 =3

b) What are the characteristics of the `C18' column (base material and functional groups attached) and for what type of biomolecules should it be used? What type of solvent system (comment on the polarity, isocratic vs gradient) will you choose for the same(the biomolecule you have picked up) and why? 3

c) For carrying out mixed mode separations (based on size and polarity) should weak ion exchangers or strong ones be used? Explain the molecular basis for your choice. 2

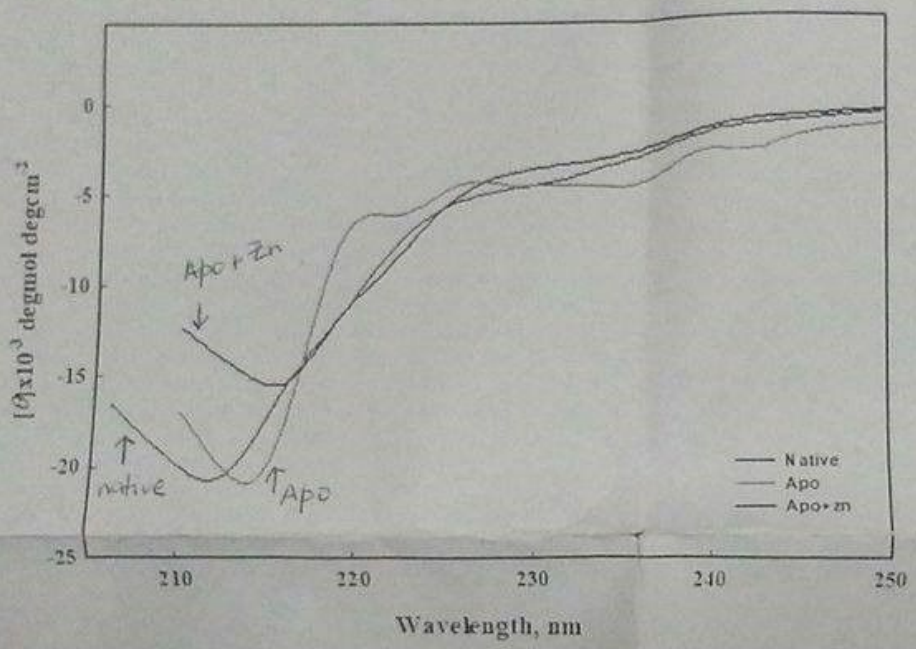
d) Why is the focus of drug development companies changed to large biomolecules? What type of molecules are these and what are the challenges faced? 3

Q.3 a) Amino acid Threonine has two centers of asymmetry. Show the possible enantiomers of this amino acid. Which wavelengths (Far or Near-UV) should you use to get a CD spectrum of poly-threonine? 2

b) Explain why poly-lysine assumes different secondary structural conformations at acidic or alkaline conditions? 2

c) Examine the CD spectrum (shown on the reverse side) and activity data obtained on native, apo+ dialysis and Zn reconstituted enzyme. Comment on the structure and activity of the Apo + dialyzed sample and the Zn reconstituted enzyme. Also, why were good results (in terms of copper removal and residual laccase activity) not obtained on using EDTA? 2 + 1= 3

Proteins	$[\theta]_{220}$	Residual Laccase activity (%)
Native	100	100
Apoenzyme after dialysis (control)	60.98	1.26
Apo + Zinc	94.25	84.81



Structure and activity data of different forms of laccase enzyme.