

1. For the case of filtration carried out under conditions of constant rate ( $V$ ,  $V_{eq}$  form), write down the filtration equation. Against what variables will you plot a graph to determine filtration parameters - identify x & y axes. What is the slope & intercept of such a plot? ....  $3+3+3=9$

2. Consider a starting crude mixture that contains your desired enzyme at 1 mg/ml concentration, and assume that causing 90% of it to precipitate constitutes an acceptable recovery at a particular salt concentration. If the enzyme was 0.1 mg/ml to start with, what level of precipitation would you obtain at the same salt concentration? What does this result tell you about the nature of the precipitation process? ...  $5+3=8$

3. For a negatively-charged polyelectrolyte - positively-charged protein system, sketch <sup>& explain</sup> the enhanced precipitation effect occurring with addition of salt as a function of pH. How can this effect be used to determine the binding stoichiometry? ....  $10+5=15$

4. Identify the key variables appearing in the Karman-type equation for packed beds. .... 8