

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examinations 2008/09**

**Module Title: Bioanalytical Science 4**

**Module Code:** BIOT 6002

**School:** Science

**Programme Title:** Bachelor of Science in Applied Biosciences – Stage 2

**Programme Code:** SBIOS\_7\_Y2

**External Examiner(s):** Prof. G. Walsh  
**Internal Examiner(s):** Ms. Anne Ward

**Instructions:** Answer FOUR questions only. Each question carries equal marks.

**Duration:** 2 Hours

**Sitting:** Autumn 2009

**Requirements for this examination:**

**Note to Candidates:** Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.  
If in doubt please contact an Invigilator.

- Q1. (a) Outline, with the aid of a diagram, the principle of gel filtration chromatography. (10 Marks)
- (b) Define each of the following:
- (i) Elution volume ( $V_e$ )
  - (ii) Void volume ( $V_o$ )
  - (iii) Partition coefficient ( $K_d$ ) (6 Marks)
- (c) Explain, from an experiment you have performed in the laboratory, how you would estimate each of these parameters. (9 Marks)
- Q2. Write an overview of TWO of the following immunoprecipitation techniques. Include a diagram, where relevant, in your answer.
- (a) Single Radial Immunodiffusion (SRID)
  - (b) Immunodiffusion (Ouchterlony assay)
  - (c) Rocket Immunoelectrophoresis (25 Marks)
- Q3. (a) Immunoaffinity chromatography is an important bioanalytical technique used for polyclonal antibody purification. Describe the principle and application of this technique. (12 Marks)
- (b) List TWO examples of other group specific ligands used in affinity chromatography. (6 Marks)
- (c) Write a brief note on the application of affinity chromatography (7 Marks)

- Q4. Write short notes on **TWO** of the following:
- (i) Control charts in internal quality control
  - (ii) Potential sources of error in a bioanalytical laboratory.
  - (iii) Assessment of accuracy (25 Marks)
- Q5. (a) Define each of the following terms:
- (i) Antigenic determinant (3 Marks)
  - (ii) Hapten (3 Marks)
  - (iii) Paratope (3 Marks)
- (b) Outline, using a diagram, the principle of a non-competitive sandwich ELISA. (16 Marks)
- Q6. (a) Describe the principle of isoelectric focusing. (10 Marks)
- (b) List the main methods of identification and quantitation of macromolecules post-electrophoresis (10 Marks)
- (c) Outline briefly any method of protein detection post electrophoresis which you have used in the laboratory. (5 Marks)