

Cork Institute of Technology

Higher Certificate in Science in Applied Biology – Stage 1

(National Certificate in Science in Applied Biology – Stage 1)

(NFQ – Level 6)

Autumn 2005

Laboratory Practice

(Time: 3 Hours)

Instructions

Answer **FIVE** questions.

Answer **TWO** from each Section.

Answer the **5th question** from either A or B.

Use **separate answer books** for each Section.

Examiners: Ms. R. Kiernan

Dr. M. Sheahan

Prof. R. Fitzgerald

Section A

- Q1. “Both the quality of the reagents/materials used AND the skills/expertise of the analyst are central to obtaining quality reliable results in chemical analyses”. Discuss this statement under the following headings:
- (a) In terms of quality and appropriate usage, distinguish between reagent (ACS) grade, primary standard grade and special purpose grade chemicals. (6 marks)
 - (b) List the basic rules which should be observed when handling solid and liquid reagents in the laboratory. (8 marks)
 - (c) Identify the different types of glassware which can be found in a typical laboratory and indicate the purpose(s) for which they would be most appropriate. (6 marks)
- Q2. (a) Write a note on the Safety, Health and Welfare at Work Act (1989) in terms of the responsibilities it places on employers, employees and manufacturers for the prevention of work-related accidents and ill-health. (10 marks)
- (b) Discuss electrical hazards in a typical laboratory. In your discussion, (i) identify specific electrical hazards and (ii) explain how they may be minimized or eliminated. (10 marks)

- Q3. A solution is defined as a homogeneous mixture of 2 or more substances. Solution concentration specifies the amount of solute relative to the quantity of solvent. Three common concentration units used in chemistry laboratories are molarity, parts per million and % composition.
- (a) Explain each of the underlined terms. Use examples and/or formulae to support your explanations. (8 marks)
- (b) Determine the molarity of concentrated Nitric acid (HNO_3) given its % composition is 72% w/w and its density is 1.42g/cm^3 . (6 marks)
- (c) Write the following in order of increasing concentration; 50 ppm Na^+ , 50 ppm K^+ or 50 ppm Fe^{2+} . Note this requires determining the molar concentration of each of the three solutions. (6 marks)

Atomic masses (a.m.u.): $\text{H} = 1.008$; $\text{N} = 14.007$; $\text{O} = 15.999$
 $\text{K} = 39.098$; $\text{Na} = 22.989$; $\text{Fe} = 55.847$

Section B

- Q4. (a) Explain what is meant by the terms, accuracy and precision in laboratory measurements. (4 marks)
- (b) Write an essay on the major sources of error in laboratory analyses. Comment on how these errors can be minimized to guarantee the quality of the results produced. (16 marks)
- Q5. Discuss the role of first aid personnel in treating an unconscious casualty. Use the underwritten headings as guidelines.
- (a) Aims, signs and symptoms (6 marks)
- (b) Level of responsiveness (6 marks)
- (c) Treatment (8 marks)

Q6. Write notes on ALL of the following:

- (a) Preparation of Standard solutions (5 marks)
- (b) Analytical Balances (5 marks)
- (c) Aseptic Technique (5 marks)
- (d) Laboratory safety procedures (5 marks)