

Cork Institute of Technology

Higher Certificate in Science in Applied Biology - Stage I

(NFQ – Level 6)

Summer 2006

Laboratory Practices - (Old Syllabus)

(Time: 3 Hours)

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. (a) Perform the appropriate calculations to determine which of the following solutions contains the greatest number of moles of Na^+ :

(i) 30cm^3 of $0.15\text{M Na}_2\text{CrO}_4$

(ii) 25cm^3 of $0.08\text{M Na}_3\text{PO}_4$

(iii) 55cm^3 of 0.02M NaCl

(6 marks)

(b) As their supervisor, list the instructions you would give laboratory personnel with regard to their behaviour and conduct in the laboratory

(4 marks)

(c) Describe the appropriate actions to be taken in each of the following cases:

(i) Safe handling and treatment of spillages in a chemistry laboratory

(ii) Safe and appropriate disposal procedures for chemical reagents

(10 marks)

Q2. (a) Write a comprehensive note on laboratory safety signs. Use the following guidelines: their purpose, the different categories of safety signs available in terms of shape, color schemes and type of information they contain. Support your answer with examples.

(10 marks)

(b) Write a brief note on two of the following:

- (i) Radiation hazards in the laboratory
- (ii) Flammability hazards in the laboratory
- (iii) Carcinogens

(10 marks)

Q3. (a) Distinguish between primary standard grade, reagent grade and special purpose grade chemicals on the basis of their purity and application.

(6 marks)

(b) List the different mechanisms by which electrocution can occur AND clearly differentiate between them.

(8 marks)

(c) Explain the importance of using the correct fuse and appropriate cable both for the operation of a device and the safety of its users.

(6 marks)

Section B

- Q4. What first aid treatment would you administer to a colleague who suffered severe burns in a laboratory accident? Comment on the depth and extent of burns in determining danger to life and the outcome of the accident. (20 marks)
- Q5. (a) Calculate the weight of Sodium Carbonate (106g/mol) and Sodium Hydrogen Carbonate (84g/mol) required to make a 0.2M bicarbonate buffer of pH 10 and pK_a of 10.25 (10 marks)
- (b) Prepare 50cm³ of a 0.4M Hydrochloric acid (36.5g/mol) solution from concentrated HCl (36% w/w) given s.g. = 1.18g cm⁻³. (5 marks)
- (c) Comment on the possible sources of error in the preparation of the reagents in parts (a) and (b) above. (5 marks)
- Q6. The decontamination of cultures and items contaminated by bio hazardous agents is a vital step towards protection of laboratory personnel from infectious disease. Discuss. (20 marks)