

**CORK INSTITUTE OF TECHNOLOGY  
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

**Autumn Examinations 2008/09**

**Module Title: Bioanalytical Science 1 (CA)**

**Module Code: BIOL 6003**

**School: Science**

**Programme Title: Bachelor of Science in Applied Biosciences – Stage 1**

**Programme Code: SBIOS\_7\_Y1**

**External Examiner(s): Prof. Gary Walsh**

**Internal Examiner(s): Ms. Maryanne Sheehan, Ms. Richenda Kiernan**

**Instructions: Answer FOUR questions, TWO from each Section. Answer Question 4 (compulsory) in Section B.**  
**Use separate answer books for each section.**

**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.

## Section A

Q1. In the interest of health and safety, it is imperative that laboratory personnel are aware of the proper code of conduct and have access to information relating to the chemicals they are using. Specific information relating to a chemical can be found in its Material Safety Data Sheets (MSDS). These sheets give information on flammability (flash point), acute and chronic toxicity, threshold limit value(s), LD<sub>50</sub> values, explosive limits (UEL & LEL); handling, disposal, reactivity etc. Answer the following on the above passage:

- (a) Define clearly the underlined terms (6 Marks)
- (b) Differentiate between the terms acute and chronic toxicity. Give an example of a chemical which can have these effects (5 Marks)
- (c) Write a note on what should be included in the spillage and disposal procedures. (6 Marks)
- (d) As a laboratory manager, what instructions would you issue to laboratory personnel with regard to their behavior and conduct while working in the laboratory. (8 Marks)

Q2. Discuss fire safety under the following headings:

- (a) Measures that should be in place to prevent fires.
- (b) Course of action when a fire occurs.
- (c) Evacuation procedure(s).
- (d) Fire extinguishers; types, their use and suitability for different fires

(25 Marks)

- Q3. (a) Identify a source of ionizing and non-ionizing radiation in the laboratory. Which is the more hazardous and why? (3 Marks)
- (b) What is the difference between the following radiation units; the *Gray* and the *Becquerel*? (4 Marks)
- (c) Outline the protective measures which must be observed to minimize and/or eliminate exposure to radiation in the laboratory. (6 Marks)
- (d) 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 (12 Marks)

## Section B

Q4. Answer ALL of the following

- (a) List two safety precautions when working in the biology lab. (2 Marks)
- (b) Convert 0.035ml to microlitres. Which of the following pipettes should be used to deliver this volume: P100, P1000 or P5000? (3 Marks)
- (c) (i) What two buffers are used to calibrate the pH meter? (1 Mark)
- (ii) List 3 ways the pH of a solution can be measured and comment on the accuracy of each. (5 Marks)
- (d) (i) What is a standard solution? (2 Marks)
- (ii) Describe the correct procedure for the preparation of a 2.0% w/v glucose solution. (4 Marks)
- (e) Draw a rough graph to illustrate what is meant by the lambda max ( $\lambda_{\max}$ ) of a solution. Label the axes appropriately (5 Marks)
- (f) What is the purpose of an indicator in acid-base titrations? Give an example of an indicator (3 Marks)

- Q5. (a) Discuss the role of first aid personnel in treating an unconscious casualty. Use the underwritten headings as guidelines
- (i) Aims, signs and symptoms (6 Marks)
  - (ii) Levels of responsiveness (6 Marks)
  - (iii) Treatment (8 Marks)
- (b) List the contents of a first aid box. (5 Marks)
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- Q6. (a) Write a comprehensive note on the classes of biological safety cabinets. (15 marks)
- (b) Outline the general safety precautions which should be adhered to when working in a laboratory. (10 Marks)

							Periodic Table													
IA	IIA													VIII						
1 <b>H</b> 1.01	4 <b>Be</b> 9.01													2 <b>He</b> 4.00						
3 <b>Li</b> 6.94	5 <b>B</b> 10.8			6 <b>C</b> 12.0		7 <b>N</b> 14.0		8 <b>O</b> 16.0		9 <b>F</b> 19.0		10 <b>Ne</b> 20.2								
11 <b>Na</b> 23.0	12 <b>Mg</b> 24.3			13 <b>Al</b> 27.0		14 <b>Si</b> 28.1		15 <b>P</b> 31.0		16 <b>S</b> 32.1		17 <b>Cl</b> 35.5		18 <b>Ar</b> 40.0						
19 <b>K</b> 39.1	20 <b>Ca</b> 40.1			21 <b>Sc</b> 45.0		22 <b>Ti</b> 47.9		23 <b>V</b> 50.9		24 <b>Cr</b> 52.0		25 <b>Mn</b> 54.9		26 <b>Fe</b> 55.9						
37 <b>Rb</b> 85.5	38 <b>Sr</b> 87.6			39 <b>Y</b> 88.9		40 <b>Zr</b> 91.2		41 <b>Nb</b> 92.9		42 <b>Mo</b> 95.9		43 <b>Tc</b> (99)		44 <b>Ru</b> 101						
55 <b>Cs</b> 133	56 <b>Ba</b> 137			57 <b>La</b> 139		72 <b>Mf</b> 179		73 <b>Ta</b> 181		74 <b>W</b> 184		75 <b>Re</b> 186		76 <b>Os</b> 190						
87 <b>Fr</b> (233)	88 <b>Ra</b> (226)			89 <b>Ac</b> (227)		104 <b>Rf</b> (261)		105 <b>Db</b> (262)		106 <b>Sg</b> (263)		107 <b>Bh</b> (264)		108 <b>Hs</b> (265)						
						110 <b>Pt</b> (269)		111 <b>Au</b> (272)		112 <b>Hg</b> (277)		113 <b>Tl</b> (284)		114 <b>Pb</b> (285)						
						122 <b>Sb</b> (122)		123 <b>Te</b> (128)		124 <b>I</b> (127)		125 <b>Xe</b> (131)		126 <b>At</b> (210)						
						209 <b>Bi</b> (209)		210 <b>Po</b> (210)		211 <b>At</b> (210)		212 <b>Rn</b> (222)								
								116												