

CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

Autumn Examinations 2016

Module Title: Applied Separation Technology

Module Code: BIOM8001

School: Biological Sciences

Programme Title: BSc (Honours) in Herbal Science – Year 4
 BSc (Honours) in Nutrition and Health Science – Year 3
 BSc Food Science and Technology – Year 3

Programme Code: SHERB_8_Y4
 SNHSC_8_Y3
 SFSTE_7_Y3

External Examiner(s): Dr. Tom O Connor

Internal Examiner(s): Germain Levieille

Instructions: Answer any 4 of the 6 questions asked. Each question carries a equal mark weighing of 25%. Please state clearly the questions addressed in your paper.

Duration: 2 hours

Sitting: Autumn 2016

Requirements for this examination: Calculator

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) What are the methods available to achieve separation of cells and biomass debris from a liquid maceration? (10 marks)
- b) Give an outline of the main principles guiding the separation for each of the available methods. (8 marks)
- c) Comment on the advantages and limitations of the methods mentioned in b). (7 marks)
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- Q2.** a) Detail the process of reverse osmosis. How does it work and what are its applications and limitations? (8 marks)
- b) Separations by reverse osmosis and by nanofiltration can be considered to achieve similar level of separation. Discuss the differences, similarities and relative advantages of these two methods. (10 marks)
- c) Which method would you choose to remove salt from seawater to obtain drinking water? Why? (7 marks)
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- Q3.** a) Explain the principle of gas chromatography? (8 Marks)
- b) Discuss the derivatization of Fatty Acids prior to separation by GC. (7 Marks)
- c) Discuss the applications of GC combined with Mass Spectrometry as analytical method to identify the chemical nature of natural products? (10 Marks)
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- Q4.** Give definition and description for these terms used in separation technology:
- a) Flocculation (5 marks)
- b) Dead-End Flow filtration (5 marks)
- c) Cross Flow filtration (5 marks)
- d) Expression (5 marks)
- e) Reverse phase chromatography (5 marks)

- Q5.**
- a) How would you choose a HPLC method of quantification of a known natural compound in an extract? (5 marks)**
 - b) Indicate the factors to consider to optimise the method and detail the steps you would take to proceed in your optimisation. (10 marks)**
 - c) Discuss the plate theory of chromatographic separation. How does it help to understand and improve the quality of chromatographic separation of compounds in liquid column chromatography? (10 marks)**
- Q6.** You have a 2-Liters aqueous solution containing 200.0 mM of compound C. This solution is extracted with 500.0 mL of diethyl ether and the aqueous phase is assayed and it is found that the concentration of compound C that remains is now at 40.0 mM.
- a) What is the equilibrium constant for this extraction system? (10 marks)**
 - b) How much compound C will remain in aqueous solution after three extractions? (10 marks)**
 - c) What will be the percentage of recovery of the compound C after three extractions (5 marks)**