

OLLSCOIL NA hÉIREANN

NATIONAL UNIVERSITY OF IRELAND, GALWAY

SUMMER EXAMINATIONS, 1999

B.Sc. (Denominated B.Sc. Degree in Marine Science; Honours)*MR 401: Advanced Topics Paper 2*Professor A. Eleftheriou
and the internal examinersTime allowed: *Three hours.*Answer *four* questions, at least **ONE** from each section.**SECTION A**

1. Discuss the interactions between pollutants and microorganisms in marine environments.

OR

Discuss bioremediation and its application in marine environments.

2. Describe the distribution of phytoplankton in relation to the physical oceanography around the island of Ireland.
3. Describe the difficulties associated with sampling in the deep sea and how modern technological developments are helping overcome these problems.

OR

Describe the physical environment of hydrothermal vents and relate this to associated faunal zonation patterns.

SECTION B

4. Write an essay describing genetic profiling technology. List the potential applications of this technology in biological studies.
5. "Molecular techniques have radically altered our knowledge of microbial ecology". Discuss, and include an example of the molecular approach in studying marine microorganisms.
6. Write an essay entitled "Cloning mRNA populations".

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SECTION C

7. What are the different types of atomic spectroscopy used today by marine chemists? Describe one atomic spectroscopy method of your choice, comment on the principles involved, and the precautions you must take to ensure accurate results.
8. The accompanying diagram shows;
 - (1) A calibration curve (absorbance versus known metal concentration in standards) for furnace atomic absorption is shown. Is it valid? Why? Would it be proper to extrapolate the curve if the sample had a concentration above the upper limit of the curve?
 - (2) This curve was obtained for a similar calibration, but using another element, in flame atomic absorption with an air/acetylene flame. Comment on its applicability and explain why it has the observed shape.
 - (3) This curve of output power versus concentration was obtained when attempting to calibrate a fluorimeter with a plant pigment (such as chlorophyll). Explain. Is this curve of any use in analysis?
9. The accompanying diagram (4) shows a vertical section of dissolved copper concentration in microgram/litre in coastal seawater against depth, from the coast on the right to deeper water 100 nautical miles off-shore. Active upwelling and photosynthesis are taking place. Nutrients are plentiful. Explain the observed distribution in terms of physical movements of the water, metal uptake and decay.