

C 63167

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Name.....

Reg. No..... 37

**SECOND SEMESTER M.Sc. DEGREE EXAMINATION, JUNE 2014**

(CUCSS)

Environmental Science

ES 2C 06—ENVIRONMENTAL CHEMISTRY—II

(2010 Admissions)

Time : Three Hours

Maximum : 36 Weightage

**Part I**

*Answer all questions.*

*Each question carries a weightage of 1.*

1. What is Calomel electrode ?
2. What is meant by single electrode potential ?
3. What is the function of a salt bridge in an electrochemical cell ?
4. List three sources of 800 nm. What type of spectrophotometer should be used to measure this radiation ?
5. What is Beer-Lambert law ? How does it affect the spectral intensity ?
6. Describe the role of polarity in adsorption column chromatography.
7. What is "temperature programming" as used in gas chromatography ?
8. What are the largest and smallest R<sub>f</sub> values possible ?
9. Why gelatinous precipitates are not digested ? Why curdy precipitates are not digested ? Explain.
10. How the relative super saturation be varied during precipitate formation ?
11. What is the useful frequency range investigated in infrared spectroscopy ? What is the radiation source of light used ?
12. "Activation analysis is highly sensitive to trace quantity determinations." Substantiate the statement.
13. What is the meaning of "binding energy" ? Which type of elements has the most stable nuclei ?
14. Compare the behaviour of  $\alpha$ ,  $\beta$  and  $\gamma$  radiations in an electric field.

(14 × 1 = 14 weightage)

**Part II**

*Answer any seven questions.*

*Each question carries a weightage of 2.*

15. Construct the setup and explain the method for the measurement of the pH of a given acid solution.
16. Discuss the role of supporting electrolyte in electrochemical methods.

**Turn over**

17. Compare the advantages and disadvantages of nephelometry and turbidimetry.
18. Describe the working principle of a gas chromatograph.
19. Describe briefly the principle involved in ion selective electrode. How is it employed for quantitative estimation of sulphide ions in solutions ?
20. What is co-precipitation ? List the different types of co-precipitation and indicate how they may be minimized or treated for.
21. Briefly explain the finger print region in infrared spectroscopy.
22. Write a short note on "Stripping analysis".
23. How do nuclear reactions differ from ordinary chemical reactions ?
24. Explain the similarities and differences between a cloud chamber and a bubble chamber.

(7 × 2 = 14 weight)

### Part III

Answer any **two** questions.

Each question carries a weightage of 4.

25. (a) Explain how a potentiometer works. Why can't an ordinary potentiometer be used for measurement with a glass electrode ?  
(b) Explain the working of a UV visible spectrophotometer. Describe the spectrophotometric method for the estimation of nitrite in water sample.
26. (a) Discuss the unit operations commonly used in gravimetric analysis and briefly indicate the purpose of each.  
(b) Write a short note on "X-ray fluorescence spectrometry".
27. (a) What is mass spectrometric method ? How is it employed in analyzing air samples containing a compound of hydrocarbon with  $\text{Cl}_2$  ?  
(b) How is activation technique (measurement of radioactivity) helpful in atmospheric analysis ?
28. (a) What is radiometric titration ? How is it carried out ?  
(b) Write short note on (i) direct isotopic dilution method; and (ii) inverse isotopic dilution method.

(2 × 4 = 8 weight)