

SAULT COLLEGE  
of Applied Arts and Technology  
Sault Ste. Marie

COURSE OUTLINE

CHM 230-3

WATER CHEMISTRY

Taught to WRT 3 and PPE 3

revised January 3, 1983 by D. Heggart

## WATER CHEMISTRY

CHM 230-3

### INTRODUCTION

CHM 230 is a continuation of the Analytical Concepts begun in CHM 215 (semester 2). However, CHM 230 focuses on water quality parameter in both Theory and Lab parts of the course. The course involves 1 hr. of Theory per week and a lab each week. A total of 6 labs are required for the course. These include the following: Acidity, Alkalinity, pH, D.O., B.O.D., C.O.D., Hardness.

### EVALUATION

Theory - Mid Term Test	
- Final Exam	50%
- Assignment(s)	
Lab - 6 labs	50%

All assignments and labs must be submitted the day they are due. Late assignments will not be marked, while late lab assignments lose 10% per week for lateness.

### TEXTBOOKS

UPON COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

- \* 1. Using the production of  $\text{SO}_2$  as a by-product from smelting and/or electrical generation, be able to calculate the amount of  $\text{SO}_2$  produced from burning of coal containing X%S, and write equation, and make calculations regarding control methods such as scrubbing (limestone, magnesium oxide), Cat-ox, etc.
2. Using typical data from a water analysis, calculate the hardness and alkalinity and express the result in mg/L as  $\text{CaCO}_3$ .
3. Draw mEq./L bar graphs, list the hypothetical combinations, and determine concentrations of these combinations, given typical water analysis data.
4. Discuss water hardness, its two types, the difference between each, the cause of each and the method by which each can be reduced.
5. Calculate T-ALK, P-ALK, M-ALK
6. Explain the key points regarding alkalinity.
7. Make calculations involved in determining water acidity and pH.
8. Calculate the pH of a  $\text{NaHCO}_3$  solution.
- \* 9. Graph the data from a potentiometric titration, including first and second derivative plot to determine the cell emf at the end point.
10. Collect water samples in the approved manner and treat these samples for later laboratory analysis.
- \* 11. Discuss and explain the rationale for the presence of various controversial chemicals (Kepone, Mirex, 2,4-D, 2, 4, 5-T, Dioxin, Radionuclides, etc.) and explain the concern for their use, their affect on the environment, etc.
12. Make calculations involved with the determination of D.O. (Azide method), B.O.D.<sub>5</sub>, and C.O.D. in samples collected from the area.
  - D.O. - Root River
  - B.O.D.<sub>5</sub> - Sewage Plant Effluent (Primary)
  - C.O.D. - Algoma Steel (Settling Pond)
13. Explain the various types of analytical Instrumentation that are used in Water Analyses and what they are used for:
  - A.A. - Metallic ions
  - G.C. - Organics
  - H.P.L.C. - Organics
  - etc.
14. Discuss the various water quality parameters according to the following classifications:
  - a) Physical characteristics
  - b) Dissolved Gases
  - c) Metals
  - d) Organics
  - e) Radionuclides

15. Explain the effect aeration has on water quality and how it can affect odour and colour.
16. Make calculations for and be able to prepare standard solutions as required.