2nd Outline – Solution Molecular Weight of Small Molecules

Tawana M. Robinson – 2/21/2012

I. Introduction

- Define the cryoscopic method and it pupose to determine molecular weight of a unknown (for small molecules - <100 g/moles)
- Brief history of the cryoscopic method and why the apparatus design has remained useful as a current application tool.
- Example of usefulness: petroleum industry for crude oil evaluation

II. Freezing Point Depression

- Define Freezing Point Depression.
- Show equations for non-electrolyte and electrolyte solutions.
- Define the variables for the equations.
- Show a sample calculation of how to use the equations.
  - FIGURE
- Relate a phase diagram.
  - FIGURE

III. Equipment SetUp

- Selection of Solvent (and explain why benzene is the preferred solvent)
- Apparatus Set-Up
  - FIGURE
- Types of Samples and examples
  - Ionic : salts (use reference from published article)
  - Non – Ionic (use reference from published article – best example would be with the oil/crude industry)

IV. Cryoscopic Procedure

- Procedure from General Chemistry Lab that I am a TA or
- Procedure from Chemical technicians' ready reference handbook
  By Gershon J. Shugar, Jack T. Ballinger, Linda M. Dawkins
- Data Collection (data that is important for calculations and to solve for the molecular weight)

V. How to Analyze Data with an example

- Trial Data Set
- Sample Calculations to solve for the molecular weight

VI. Bibliography (not a complete list) – still researching

1.) Chemical technicians' ready reference handbook
By Gershon J. Shugar, Jack T. Ballinger, Linda M. Dawkins

2.) McQuarrie, Rock, and Gallogly: **General Chemistry, 4th Edition** (University Science Books)

3.) Krauss and Vingee, JACS, 1933, Volume (56)