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Due: February 21, 2012
CHEM 475

Combustion Analysis Module Outline

- 1) History of Combustion Analysis
 - a) Discovery by Joseph Gay-Lussac
 - b) Improvement of the method
 - i) Use since the 1780's
 - (1) 1789: Lavoisier's Oil Analysis
 - ii) "Takes off" in the first half of the 19th century
 - (1) 1827: William Prout: analysis by volume
 - (2) 1831: Justus Liebig: simplified combustion apparatus
 - (3) 1831: Liebig's Nitrogen Determination
 - (4) 1841: Jean-Baptiste André Dumas: Combustion Train
 - iii) 1923: Fritz Pregl receives Nobel Prize for micro-analysis of organic substances using combustion analysis
 - c) Used as the primary tool to characterize organic molecules
- 2) Various types of combustion analysis
 - a) Combustion train
 - b) CHN analyzer
 - c) Etc. •
- 3) Limitations of the method
 - a) Amount of sample needed
 - i) 1780's: needed 50 grams
 - ii) 1820's: 5 grams
 - iii) 1923: 5 mg or less
 - b) Destroys the sample
 - c) Spectroscopy is more informative, more sensitive, and easier
- 4) Types of samples that can be used
 - a) Used primarily for organic compounds
- 5) Detailed instructions on how to perform
 - a) Image of Combustion Analysis machine
 - b) Directions of how to prepare sample
 - i) Step-by-step photos of how to prepare sample
 - ii) What type of capsules to store sample
 - c) Directions of how to run sample in the machine
- 6) How combustion analysis works
 - a) Step-by-step details
- 7) How to calculate desired information
 - a) Composition by Mass
 - b) Elemental Analysis
 - i) Composition with Carbon and Hydrogen
 - ii) With C, H, O
 - iii) With C, H, O, N

- (1) Worked out example of normal results
 - (2) Worked out examples of "unique" or "special" examples
 - (3) Problems for the reader to try
- 8) Alternatives to combustion analysis
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