Iron-Oxidizing Bacteria in the Deep Ocean

Introduction: The chemical composition on the deep ocean floor is drastically different than on the earth's surface. A particular location deep on the ocean floor near Hawaii is rich in iron. Bacteria living here perform redox reactions with this iron on the ocean floor. The findings are reported in a scientific paper, "Ultra-diffuse hydrothermal venting supports Fe-oxidizing bacteria and massive umber deposition at 5000m off Hawaii" by Edwards et al. (2011)

Objectives

- Understand iron oxidization by bacteria in the deep ocean
- Understand the scientific process including data collection and analysis
- Learn to read and present scientific papers

Materials

- "Ultra-diffuse hydrothermal venting supports Fe-oxidizing bacteria and massive umber deposition at 5000m off Hawaii" by Edwards et al. (2011)
- FeMOdeepdata_Fig2: excel file with raw data for figure 2 of paper
- Handout: How to read a scientific paper
- Handout: How to present a scientific paper
- Methods video: FeMatROVsensor.avi

Instructions

- Read "Ultra-diffuse hydrothermal venting supports Fe-oxidizing bacteria and massive umber deposition at 5000m off Hawaii" by Edwards et al. (2011) Refer to guide to reading scientific papers.
- Graph Figure 2 using the raw data in the excel file provided.
    - Put depth on the Y axis.
    - Put dissolved oxygen concentration and iron concentration on the x-axis.
    - Be sure to label your graph and axis and any legends needed.
    - Write a description for Figure 2 describing the main point(s) it shows.
- Balance redox reaction using the half-reaction method
- Calculate Gibbs free energy (ΔG^{o}_{rxn}) at $0^{o}C$ and $400^{o}C$
- Assemble a PPT presentation (6-10 slides) for this article (use only figures 1, 2 (your drawn one) and 7 in your presentation). Include your balanced redox reaction and Gibbs free energy calculation. Refer to guide to presenting scientific papers.

TOOLKIT CREDITS:

Developed by Martin Diaz, Los Angeles Trade Tech Community College (CA) with materials and guidance provided by Jason Sylvan, University of Southern California, CA) and support by the rest of the C-DEBI Collaborative Toolkit Team.

WEBSITE:

http://www.coexploration.org/C-DEBI/toolkits_chemistry.html