

Iron-Oxidizing Bacteria in the Deep Ocean

Instructor Guide

Introduction:

Course: This activity is designed for General Chemistry.

Time: in-class time ~30min, out-of-class time ~3-4 hours (can be done in class too)

Materials: activity documents, computer with PPT

Student preparation: knowledge of balancing equations, oxidation-reduction reactions, computer literacy

Summary: This activity examines the role of iron as a nutrient source for bacteria in the deep ocean. It also familiarizes students with reading and presenting primary scientific papers.

Purpose:

1. Understand the chemistry in part of the deep ocean.
2. Apply redox reactions to living organisms.
3. Read and present scientific papers. Work with data and graphs.

Resources:

- PPT: Iron-oxidizing bacteria in the deep ocean (for instructor): introduction
- PPT: How to read and present a scientific paper (for instructor)
- “Ultra-diffuse hydrothermal venting supports Fe-oxidizing bacteria and massive uranium 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
- Assignment: “Ironoxidizing”; handout with instructions for student activity
- Videos (embedded in PPT):
 - C-DEBI introduction:
<https://www.youtube.com/watch?v=wiYzGL4iTY8&feature=youtu.be>
 - Methods: FeMatROVsensor.avi

Activity Outline

1. Instructor introduces the chemical concepts of the paper and the activity (~30 min)
 - a. Use PPT as a guideline to introduce iron-oxidizing bacteria in the deep ocean for the paper
 - b. Video introduction of C-DEBI:
<https://www.youtube.com/watch?v=wiYzGL4iTY8&feature=youtu.be>
2. Instructor explains how to read and present a scientific paper
 - a. Use PPT “how to read and present a scientific paper”
 - b. Handout guidelines to reading and presenting a scientific paper
3. Students complete activity ~3-4 hours
 - a. Can be done in a lab section or out of the class
 - b. Students can present their PPT in class, if desired

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