Summer 2018

Development of Chemistry Activities for Local Outreach in STEM

Emily Knight
Taylor University

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Emily Knight, Dr. Patricia Stan
Department of Chemistry and Biochemistry, Taylor University

Introduction

This research project was started because of an increase in outreach opportunities for the Department of Chemistry and Biochemistry. We were invited to give a lesson and demos at Basics and Lift this past year. For similar future opportunities, we now have bins of content that are simple to use, encouraging more students to participate in volunteer outreach.

Purpose

To find, modify, and/or create grade level appropriate labs and demonstration activities for 5th-8th graders, with a specific focus on activities that involve easily available components. These activities are intended to be used for outreach to local schools by chemistry student volunteers and released online on the Department of Chemistry and Biochemistry's blog to act as a resource for teachers.

Heavily hands-on activities were specifically chosen to encourage physical science learning beyond Indiana's state standards, as science standards for 5th-8th grade focus more on the general end of science as opposed to being more specific and hands-on.

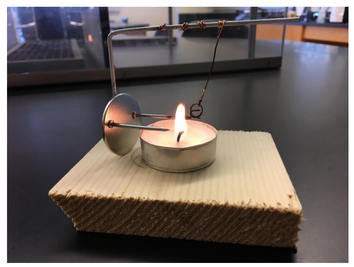
Blog address

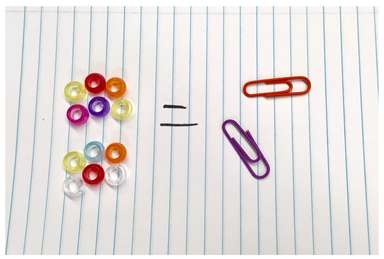
https://tuchemistry.blogspot.com/p/education-resources-title-tbd.html

The full activity overviews and some supporting documents/videos are available at the above web address.

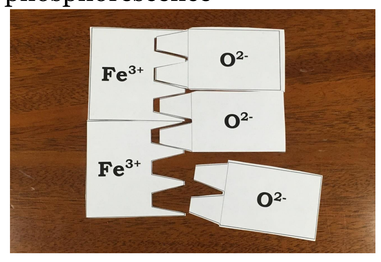
Completed Activity Overviews

Curie Engine
- Each student builds their own small Curie engine
- They can manipulate the length of the hanger, distance from the magnet, and height of the magnet
- Encourages basic problem solving skills and engineering

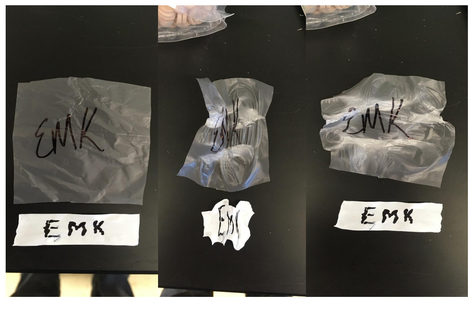




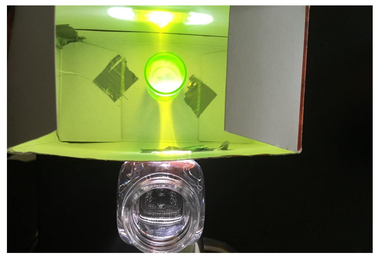
Homemade Fluorometer
- Gives an interesting introduction to the electromagnetic spectrum and the concept that different colors of light have different amounts of energy
- Compares fluorescence and phosphorescence



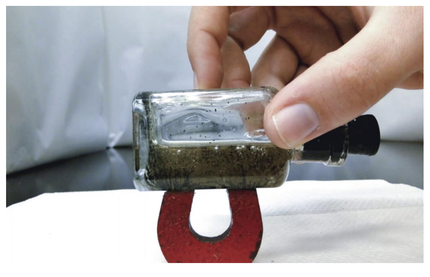
Magnet Fun
- 4 activities exploring concepts ranging from iron in food to induced electromagnetic fields
- Magnets seem like magic without knowing how they work, so giving students an opportunity to visualize magnet properties removes some mystery



Exchange Rates and Unit Conversion
- Students use the physical exchange of objects to practice how conversion works
- This then leads to talking about conversions with weight, connecting to the mole



Ionic Matching
- Includes basic descriptions of the ionic compounds the students will build
- The visual helps students understand why ionic compounds form the way they do



Polymers and their Properties
- 3 activities using polymers in different ways
- Polymer science is a growing area and not often discussed in elementary or middle school

Process

Each completed activity has 3 or 4 documents
- The full activity overview + key
  - Intended for release online and to anyone as a resource.
  - Contains all the information needed to run the activity, possible extensions that connect but aren't part of the main activity, answers to the pre- and post-activity questions, and connections to any relevant Indiana state science standards for 5th-8th grade
- The teaching sheet
  - A sheet for internal usage.
  - Intended to be simple to use for the department, so it has a guideline for the specific teaching, including tips.
- Bin Contents sheet
  - A list of all the components necessary for approximately 30 students to participate in the activity as seen on the teaching sheet
- Student Worksheet (optional)
  - Gives students extra introductory information in grade-appropriate language
  - Has simplified instructions
  - Has sample areas to record data

Conclusions/Future

Future goals include
- Completing activities focused on pressure, nanotechnology, art, and polarity
- Looking into the viability of hosting a science day camp over the summer using a version of these activities
- Using these activities and bins in local schools
- Incorporate these activities with other information to create a homeschool curriculum and lessons for specific grade levels

Acknowledgements

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- The Department of Chemistry and Biochemistry of Taylor University