ND LIGHTS DONATION PACKAGES – SPRING 2016

#1 *Agarose Gel Electrophoresis with Food Color*

Donated Equipment: 4 electrophoresis systems
Donated VWR materials: 1 balance, 2 power boxes, pipets, beakers, bottles, food color, microtubes, chemicals

The experiment allows students to gain experience in gel electrophoresis with the use of an agarose gel. The experiment allows students to understand molecular separation in a gel due to size and charge. Different food colors have different molecular weights and an overall negative charge. The dyes are mixed and placed into the wells to allow for separation where the heavier colors will move slower than the lighter colors. This experiment gives students the opportunity to construct a gel, separate food color, and understand the importance of electrophoresis. This experiment could be included in a high school AP or general Biology class.

#2 *pH and Food Science: Do you have a Bone to p(H)ick?*

Donated Equipment: 2 Corning 320 pH meters, 1 Fisher Scientific pH meter
Donated VWR materials: electronic balance, pH Buffer Kit; 10 double roll pH test paper dispensers; plastic Syringes; Stirring Rods; 250 ml Graduated Beakers

In today's society, we are constantly bombarded by advertisements for Coke products and other food products. At an equal intensity, we are also subjected to various educational programming that aims to stress the importance of healthy eating. When it comes to Coke products, many people worry about the high calories and sugar levels within the various beverages. Instead of completely cutting out these beverages, we instead opt for diet versions.

In this two-part lab, we will look at another potential danger lurking beneath the bubbly surface of our favorite foods and drinks…the acid content. Through the use of pH indicator paper and pH meters, students will be able to supplement their knowledge of acids, bases, and the relationship of pH in all of this. This lab will help students learn the connection between acid strength, acid content, and pH through the completion of simple titrations. This lab will also expose students to introductory scientific research as they try to learn about the possible effects of acids on their teeth, bones, and bodies. The second part of the lab will involve conducting their own test about these effects that they researched by the soaking and strength testing of chicken bones with the liquids from which they calculated acid content. By tying science into something as familiar as food and diet, students will be able to walk away from the experiment with a clearer idea of the complicated subject of acids/bases and their role in nutrition.

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#3 *Protein Assay with UV Spectrophotometer: So You Want to Be Like Gaston? Here is the lowdown on the protein levels in your favorite chicken eggs.*

Donated Equipment: 2 Spectronic Genesys 5 UV-Spectrophotometers
Donated VWR Materials: 250 ml Graduated Beakers; Polymethylmethacrylate cuvettes; Chicken egg Albumin

In this thrilling and educational food science lab experiment, students will perform a protein assay on a variety of store bought chicken eggs supplied by numerous vendors. The lab will include a short introductory exercise in basic scientific research and the importance of running standards. The students will use the spectrophotometer to yield absorbance data from standard chicken egg protein and various dilutions of egg whites from different types of eggs. Students will generate a calibration curve from the standard data and compare the egg white sample data to the curve to determine which egg brand has the highest albumin protein level. The experiment will address how protein (especially albumin) plays a part in diet and health.

#4 *How much caffeine is in a cup of coffee?*

Donated Equipment: 2 hot plates, two UV/Vis Spectrophotometers
Donated VWR Materials: watch glasses, beakers, nickel spatulas, stemless funnels, 10 mL graduated cylinders, disposable cuvettes
MUST HAVE: Scale which displays to 0.01 g (preferably to 0.001 g)

This experiment exposes students to (a simplified version of) professional procedures of chemical analysis by answering a seemingly straightforward question: how much caffeine is in a cup of coffee? Students will brew their own coffee; perform serial dilutions; set up a standard addition; analyze a sample by UV-Vis spectroscopy; and calculate between concentrations and amounts of caffeine in order to determine the weight percent of coffee beans and, ultimately, how much caffeine is in a cup of coffee.

#5 *Using household bleach to understand chemical kinetics*

Donated Equipment: 2 UV/Vis Spectrophotometers
Donated VWR Materials: glassware
MUST HAVE: Calculators or computer programs capable of calculating logarithms, non-linear regression

This activity uses a simple aqueous reaction of common kitchen items to provide insight into how chemists determine the rate law for chemical reactions. The experiment tracks the color change of a blue dye solution when chlorine bleach is added to the reaction vessel. The vessel, in this experiment, is a cuvette, and a spectrophotometer with a kinetics function will track the color change. Students will determine the order of the reaction and the rate constant. Based on the experimentally-obtained rate law, students will be able to determine the reaction order and mechanism of the bleaching action.

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#6 ***Absorbance Spectrophotometry: Analysis of Blue Dye***

Donated Equipment: Two UV/Vis Spectrophotometers

Donated VWR Materials: volumetric flasks, cuvettes, Blue standard dyes

The purpose of this experiment is to determine the maximum absorbance of blue food dye and then determine the concentration of blue dye in an unknown sample that is provided by the instructor. This lab aims at familiarizing students with the use of volumetric flasks and the UV/Vis absorbance spectrophotometer. In the experiment, dilutions of Blue 1 will be made and then used to generate a calibration curve from the spectrophotometer data. The students can then analyze samples of Kool-Aid drink mix to determine the quantity of Blue 1 in the drink. Comparisons can also be done between the powder drink and the boxed drink. This experiment is suitable for a high school AP Chemistry Class.

INTERESTED HIGH SCHOOLS MAY APPLY FOR A **SPECIFIC DONATION PACKAGE** (indicating the #) BY SUBMITTING A BRIEF STATEMENT OF NEED TO DR. MICHELLE JOYCE AT mjoyce@nd.edu. RECIPIENT TEACHERS MUST BE AVAILABLE FOR ON-SITE TRAINING AT THE UNIVERSITY OF NOTRE DAME AT THE END OF APRIL OR THE BEGINNING OF MAY 2016. DONATION TRANSPORTATION IS THE RESPONSIBILITY OF THE RECIPIENT SCHOOL.