August 14, 2018

Ian Smart/Research Coordinator
Intellect High School
2455 Diploma Lane

Dear Ian Smart/Research Coordinator,

Amalgamated Chemical is the manufacturer of a variety of chemical products. As a result of processing, our plant generates wastewater containing dissolved compounds of copper, tin, and zinc.

These metals could be recycled back into production if we had a method of reclaiming them from the waste solution. This would save money and reduce the amount we expel as waste, which could help protect the environment.

Several firms have been asked to submit reports on the development of a reclaiming process. We will reimburse each firm for reasonable costs. Based on the quality of the reports and cost of the research, we will offer the most efficient firm a contract to provide hazardous waste recycling services. We look forward to evaluating your report soon.

Sincerely,
Gary Garbage
Director/ Hazardous Waste Division
Amalgamated Chemical
This is our first chance to break into the chemical manufacturing market! We won’t be able to afford any analytical equipment, but I have a plan. We can use a computer simulation to precipitate copper, tin, and zinc out of solution using 5 different metals. Then they can be separated from the wastewater.

These metals are available in stock: Mg, Cu, Fe, Sn, and Zn. We also have stock solutions of compounds of each metal with nitrate.

Complete the instructions for the lab simulation for single replacement reactions. [http://intro.chem.okstate.edu/1515F01/Laboratory/ActivityofMetals/home.html](http://intro.chem.okstate.edu/1515F01/Laboratory/ActivityofMetals/home.html)

After you have completed your work, I will need the following items in a formal letter format:

- Detailed suggestions on how the chemical company could recover their tin, zinc, and copper from the wastewater.
- Data tables from your lab simulation testing.
- Metals listed in order of decreasing activity, based on your data.
- A detailed invoice for services rendered and costs incurred (materials, equipment, and labor).
- Be sure to specify any safety precautions that need to be taken.

*Your proposal should be completed by the date given in class.*