Criterion A: Planning

Defining the Problem

The client (myself) wants to create a software solution that is open source and solves Empirical Formula Problems by returning the Empirical Formula and shows how the solution was found. Empirical Formulas are one of the hardest concepts to understand when learning chemistry and oftentimes, the easiest way to learn the subject is to see the process followed to solve the equation, not just see the answer.

This project will be able to solve Empirical Formulas in Chemistry, but will not be able to solve any other aspects of the subject. This will utilize the process taught in the IB Chemistry SL class to solve Empirical Formulas by dividing by the molar mass, then the least moles to find a molecule with the correct Empirical Formula.

Rationale for the Proposed Solution

The client wants to create a standalone application for this project because it is the easiest to use for high school students who are the target audience. This application will be able to run on most school computers which high school students have access to.

By coding this software, the developer (myself) will also reinforce his knowledge of the methods used in the calculations of Empirical Formulas. There are programs available online to do this, but without user-friendly UIs and being blocked over school internet connections, a standalone application with a friendly UI would be the best way to circumvent these problems.

This will be coded in Java because it is aligned with the AP course work for AP Computer Science A and Java is easily portable to multiple computer environments.

Success Criteria (in order of importance)

1. Application readily calculates Empirical Formulas of alkanes, alkenes, and simple alcohols, compounds that have only 2 or 3 elements.
2. Application readily calculates Empirical Formulas of more complicated organic compounds which have more than 3 elements.
3. Application readily calculates Empirical Formulas of all compounds with up to 10 elements.
4. Application returns the steps necessary to find the Empirical Formula of the user input.
5. Application readily calculates Empirical Formulas of all compounds.