GNG 1103 F
Group 11

Project Deliverable B
Need Identification and Problem Statement

The clients for this product are part of a research team, currently performing a study on the ability of virtual reality to teach chemistry. The primary users for this product will be first-year chemistry students who are currently learning organic chemistry.

Some information that the client introduced to the design team included the following:

- Most students are enrolled in organic chemistry
- All students have already taken first-year general chemistry
- Most of the students are science majors
- The extent of the students' experience with virtual reality is unknown

With this information, it is known that a basic chemistry tutorial for the students is unnecessary, such as "what is a molecule," or similar mini-lessons. From the students' lack of experience with virtual reality, it is also known that this technology must be easy to use.

The primary needs that the client presented to the design team can be categorized into the following groups:

- The product must be easy to use for both students and teachers
- Students can interact with the system to increase their understanding of the topic
- Students can effectively visualize the reactions that are taking place
- Heavy focus on scientific accuracy (rates of reaction, proportionality, etc.)

This is a list of interpreted needs that the client shared with the design team. Please note that the relative importance value will be confirmed with the client at a later date.

Need	Group	Need Description	Importance
1	- Easy to use	Students and teachers with minimal virtual reality experience can use the product	5
2	- Interactive - Easy to visualize	Students can learn organic chemistry effectively with the system	5
3	- Interactive - Easy to visualize	Through visualization and interaction with the software, the students can better comprehend the topic	5

4	- Accurate	Product uses and displays scientifically-accurate material (like reaction rates)	4
5	- Easy to visualize - Accurate	System immerses students in the reaction, to help them understand all the components of a reaction	4
6	- Accurate	Focuses on speed of reaction and proportionality	4
7	- Interactive	Students can physically interact with the system	3
8	- Interactive	Software has various metrics to track students' progress	4
9	- Easy to use - Interactive	System can communicate with the student, to provide assistance	3

The design team has decided that teaching the connections between molecular and macroscopic events will help students visualize chemistry more easily. The client said that it is often difficult to visualize sub-microscopic chemistry and its impact on the macroscopic world. This will be done by changing a variable of a reaction (amount of substances, temperature, etc.), and displaying the effects on microscopic and macroscopic levels. The client also noted that common chemistry misconceptions need to be addressed. The design team will display how most collisions between molecules do not form a reaction and that all particles are in constant motion.

It must also be noted that there are several products available on the market with the same purpose of teaching chemistry to students. Some of these softwares include VisiChem, Odyssey, and countless online tutorials. Most of these products are not very interactive for students, which is the problem that will be solved. Most of these softwares also fail to represent 3-D animations and fail to show dynamic states during a reaction.

PROBLEM STATEMENT:
There exists a need for first-year organic chemistry students to effectively visualize the connection between molecular and macroscopic events with a virtual reality system that is easy to use, interactive, and addresses common misconceptions related to organic chemistry.