

CAT 4 RESOURCE DEVELOPMENT

Group 4-007 Lab Safety Precautions

Done by:

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ABSTRACT

According to our group's observation in Hwa Chong, many students are unaware of the safety precautions in the HCl chemical laboratory. As such, this resource aims to help these students in recognising the different chemical precautions and some experiments they can do with the various chemicals. Many students do not follow the safety precautions, as according to the lab staff, they do not take it seriously. Also, many students do not follow them as they feel that it is too troublesome to read or memorise all the safety precautions. Furthermore, although there is a set of notes regarding the safety precautions, it is too wordy and also very troublesome to always bring around this set of notes. Our resource aims to be much more convenient for the students as it is based on using the QR codes to find the relevant information to each chemical (e.g. safety precautions and experiments). In our tech-savvy world today, most students would turn to their mobile devices for help and this is where our project comes in to aid the safety procedures when students conduct experiments.

1 INTRODUCTION

1.1 Rationale

Many Hwa Chong students in the chemistry lab (HCl) are not taking the safety precautions of each chemical seriously according to our research and that the laboratory staff says that all these are due to the fact that students do not consider the dire consequences when handling chemicals, especially strong acids or alkalines. Hence, our project hopes to remind students constantly that there is a need to observe the safety rules and handle each experiment carefully.

1.2 Objectives

The objectives of our project is to:

- 1) Educate all students the safety precautions for each chemical
- 2) Constantly remind students the importance of safety precautions
- 3) Educate students some of the relevant experiments they can do with each chemical

****Note: Students refer to students in Hwa Chong Institution****

1.3 Target Audience

Our target audience are all students in Hwa Chong Institution, mainly the upper secondary students. This was because the upper secondary students utilise the chemistry laboratory more often than the lower secondary students. However, we still aim to educate all students the importance of observing safety rules in the lab.

1.4 Resources

Our website consists of 3 sections --- Brief Introduction, safety precautions and relevant experiments to each chemical. QR codes would be placed on chemical bottles in the chemistry laboratory and the entrance of the lab. This is so as to constantly remind students the safety precautions that they would need to observe.



CHEMICALS FOUND IN THE LABORATORY

All you need to know about the different chemicals found in the High School Laboratory. We chose the 30 chemicals to do further research on based on how frequent the chemicals were used during experiments



WELCOME TO LABORATORY SAFETY

Overview of Our Research

Our project aims to promote laboratory safety, as we know the importance of laboratory safety and also we would like to prevent any unwanted accidents to happen in the laboratory.

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You

ACETIC ACID GALACIA

How it is a hazard:

- Highly corrosive to the skin and eyes upon contact
- May damage internal organs when inhaled or ingested

Safety Precautions:

- Remove contact lenses when doing experiment related with this chemical
- Chemical should be stored in a place cool, dry and well-ventilated in an air-tight container and away from heat
- Keep away from materials such as metals, acids and alkalis
- Safety equipment must be worn at all times

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ACETIC ACID GALACIA

This acid, also known as ethnic acid, is a colourless liquid, which has a strong and pungent smell. Since it has a carbon atom in its chemical formula, it is an organic compound. Acetic acid is a main component of vinegar and gives vinegar its characteristic smell. When acetic acid is undiluted it is called glacial acetic acid. Although it is a weak acid, its concentrated form is corrosive and can damage the skin.



2 REVIEW

When our group searched over the Internet, there were such resources online too. However, these resources online are scrambled all over the Internet, making it difficult for students to view the information for all chemicals at once. Furthermore, our website consists of the more oftenly used chemicals in the HCl chemistry lab, catering to our school's students only. Those information online for each chemical were also very long-winded and were very complex such that professional terms were used.

3 METHODOLOGY

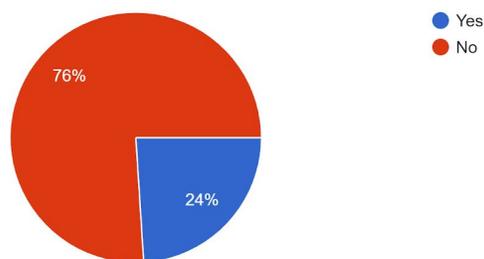
3.1 Needs Analysis

A needs analysis was done to gauge the usefulness of this project. We conducted this survey across the different levels in Hwa Chong Institution and recorded our findings. According to our findings from 50 respondents, we saw that nearly half of the students were not able to identify all safety precautions in the chemistry lab and that more than half are unsure of the various hazard signs (e.g. explosive, corrosive, etc.). Hence, from these data, we could confirm the feasibility of this project.

3.2 Survey Results

Are you able to identify the types of laboratory equipment the first time you go without the teachers help?

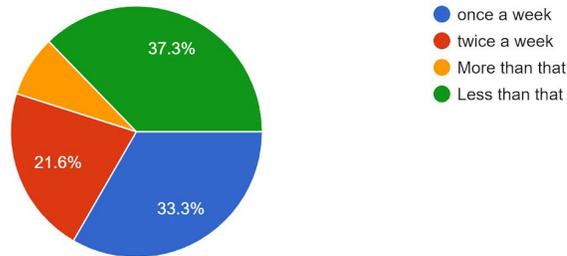
50 responses



This shows that the majority of students are unclear of the laboratory equipment.

How often do you go to the laboratory?

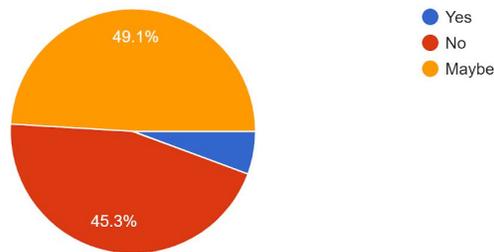
51 responses



This shows that majority of students rarely visit the lab therefore they need more knowledge on the various chemicals.

Do you know all the safety precautions in the laboratory?

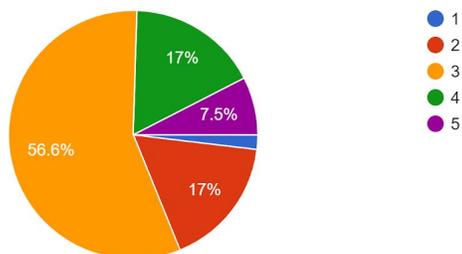
53 responses



Majority of students were either unclear or do not know the safety precautions in the lab.

On a scale of 1-5, how well do you think you can recognise a chemical and its safety hazard?(1 being not at all with 5 being very well)

53 responses



This shows that our QR codes would indeed aid students by not only recognising chemicals, but also give them a brief introduction of it. Also, the QR codes would also bring them to the safety hazards of each chemical, showing the effectiveness of the QR codes.

3.3 Development of Resources

Throughout the the process of developing this resource,we have consulted the lab staff,asking them on how our resource could be improved.At the first stage,our resource was too wordy.At the same time,we haven't came up with the idea of the QR codes.However,Madam Long stated that many of the students do not follow the lab rules as there is too much too remember or that it there is too much to remember.Furthermore,the Teachers have to continuously remind the students but the students still do not take it seriously,which can lead to the accidents to happen.In order to solve this problem, we decided that since students are much more tech-savvy, we feel that by using QR codes to link to our resource makes it much more convenient as the student can just whip out the phone to scan the QR codes.

Other than that,we have made our resource much more concise.Our resource is much more specific as the dangers and the precautions need to be taken when handling these chemicals. Madam Long has also gave us the list of chemicals that are used in HCI,hence this resource is developed to suit the needs of the Hwa Chong students

3.4 Pilot Test

A pilot test was conducted again across all levels where we published our website and asked for respondents' feedback. Generally, the responses were positive and that respondents had no problem navigating in our website. This was one of the positive feedbacks that multiple respondents have given.

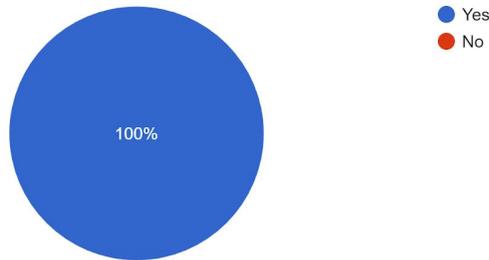
Do you think our website would help students in being able to be more mindful of their actions when in the lab?

30 responses



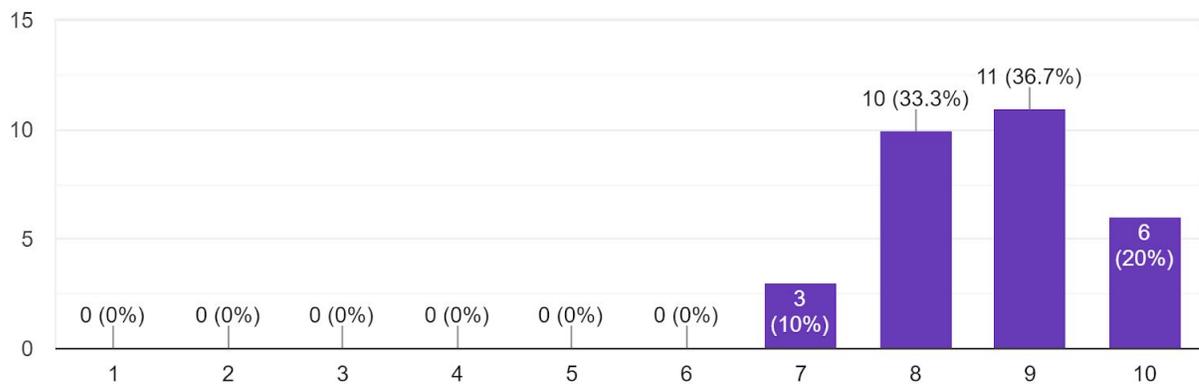
Do u think the website have indeed shown the precautionary measures of each chemical clearly?

30 responses



From a rating of 0-10, how would you rate our project?

30 responses



Indeed, we had positive feedbacks from ALL students.

4 OUTCOME & DISCUSSION

Although we received a positive response from all the respondents, we still asked about some improvements that we could make, these were some of their responses.

Top Improvements that can be made (according to students' responses):

- 1) Website can be decorated better such that it looks more presentable
- 2) Website can be more organised
- 3) Website should be even more concise and at the same time as detailed as possible so the students can be able to read finish the precautions quickly to begin their experiments.

As such, we worked on the first 2 suggestions. As for the third one, we picked out the important information to each chemical.

CONCLUSION

In conclusion, our resource aims to help students know more about the chemical precautions needed to be taken when handling the specific chemicals. Apart from that, we have made it more convenient for students to access our resources. This project had been a challenging one as we constantly improve the website to give our users the best environment to learn from. It required many hours of incessant research, web design and collating the data. However, we managed to end up with our final product that all of us are satisfied with.