

Three Effective Ways of Eliminating the Methanol in the Air

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Abstract. Objective: The purpose of this lab is to investigate and compare three ways to eliminate the methanol in the air which is commonly produced by the refurbishment of furniture, they are respectively by pineapple slices, distilled water and formaldehyde cleaner. **Methods:** The main methods used in this lab are: 1. Control variables: In these three trials, the initial concentration of methanol is the same, the time elapsed for the three reactant to react with the methanol are the same. 2. Transfer approach: Since the initial and final concentration of the methanol is hard to be measured, with the help of the test solution, we can easily get to know the instant concentration of the methanol [1]. **Results:** The ability of three ways of eliminating methanol, from high to low is distilled water, formaldehyde cleaner and the pineapple slices, based on the data that their change in the methanol concentration are respectively 4.94mg/m³, 4.80mg/m³ and 3.80mg/m³. **Conclusion:** We suggest that after painting the wall, people should use water to absorb methanols released. The pineapple slices is a relatively infeasible way to eliminate methanol.

Introduction

After the wall was polished, it produced a kind of stimulus scent that I can hardly bear. The scent was weakened after ventilating for a week. And I searched from the Internet and found that the excitant odor produced after the refurbishment is methanol, and there also lies three rumors about three effective ways to eliminate the methanol: distilled water, pineapple slices and formaldehyde cleaner.

Methanol, also known as methyl alcohol among others, is a chemical with the formula CH₃OH. Methanol is the simplest alcohol, being only a methyl group linked to a hydroxyl group. It is a light, volatile, colorless, flammable liquid with a distinctive odor very similar to that of ethanol (drinking alcohol) [2]. However, unlike ethanol, methanol is highly toxic and unfit for consumption. At room temperature, it is a polar liquid [3].

Lastly, the lab will be surrounded by observing the final concentration of three methanol glasswares with the same initial formaldehyde concentration, putting pineapple slices, distilled water and the cleaner inside respectively after the game period of time.

Materials and Methods

The laboratory is provided by Shandong Experimental Senior High School.

Materials are 1 L of distilled water, a whole pineapple, and a bottle of formaldehyde cleaner (250mL). A 35 mL of liquid methanol with the concentration of 100mg/L. And a micropipette for injecting the liquid methanol (10uL—200uL). 3 glasswares for providing a sealed environment (1L). 3 piece of cover glass for placing the methanol

to evaporate. 2 measuring glass for placing the water and formaldehyde cleaner. And a camera for taking picture for the final results.

Procedures

1. Prepare all of the materials needed for the experiment .A whole of pineapple, a 10 ml formaldehyde cleaner, a formaldehyde concentration test solution and the glassware containers. And a 10 ml of distilled water, and 35 mL of liquid methanol with the concentration of 100mg /L.(charged by Jinlong Li , Peter Zhou and Mathew Li)
2. Produce three pieces of the test solution for three trials .(charged by Jinlong Li. Peter Zhou and Mathew Li for one respectively)



Figure 1. Experimental apparatus

3. Cut a 10-g piece of pineapple slice, place it near by the test solution. (Charged by Torres Li)
4. Add 10mL of distilled water to the measuring glass, place it near by the test solution. (Charged by Mathew Li)
5. Add 10mL of formaldehyde cleaner to the measuring glass, place it near by the test solution. (Charged by Peter Zhou)
6. Use the micropipette to inject 50 uL of liquid methanol on the three covering glasses respectively, place them nearby the test solution, let it evaporate, any spearhead of the micropipette is required. (Charged by Torres Li)
7. Cover each trial with a 1L glassware to make the reacting place a sealed environment. Then after 10 min ,measure the initial concentration of the methanol gas. That is 5 ug per cubed meters. (Charged by Peter Zhou)
8. Wait for 40 min , observe the color change and compare which to the standard paper, and record the data of final concentration for each trial. (Charged by Torres Li, Peter Zhou, and Mathew Li)

Result



Figure 2. The final concentration shown by the color changed of the test solution

TRIAL 1	distilled water	formaldehyde cleaner	pineapple slices
initial concentration (mg/m ³)	5	5	5
final concentration (mg/ m ³)	0.06	0.2	1.2

Figure 3. Data table

Analysis

After executing the lab with Peter Zhou and Mathew Li, we came up with three questions about the phenomenon of the experiment.

From the data above we can initially judge the ability of three ways of eliminating methanol, from high to low is distilled water, formaldehyde cleaner and the pineapple slices. However, when we come back to check the final concentrations, we found that only the surface of glass ware which contains water is covered with a condensed vapor, which is not presented in the other two glasses. And we initially thought that was evaporated from liquid water.

Afterward we searched on the internet and found that methanol is soluble in water and is mainly because the methanol dissolved in the water vapor evaporated from the liquid [4]. However the formaldehyde cleaner has a lower volatility, hence it has a smaller abundance to combine with the methanol gases. Also, from the data we recorded, we found that the pineapple slices is not a feasible way to eliminate the methanol. However, the final concentration of the cleaner and the distilled water don't vary a lot.

However, we found that the composition of formaldehyde cleaner is all about kinds of chemicals, and there also lies an uncertainty of if all of these chemicals are not toxic from human beings [5]. In contrast, water is 100% not harmful to people also it's much cheaper, and which have almost the same effect as formaldehyde cleaner in

eliminating methanol. Hence, water is a better choice.

Finally, we are shocked by the relatively high final concentration of the pineapple's trial, that is the test solution reflects that the concentration in pineapple's trial is way higher than the other two trials. Hence we came up with the idea that the pineapple slices is a relatively infeasible way to eliminate methanol.

Conclusion

Consequently, we can conclude that the ability of three ways of eliminating methanol, from high to low is distilled water, formaldehyde cleaner and the pineapple slices. And water and formaldehyde cleaner are relatively the two effective ways to eliminate methanol, whose difference is the volatility. And the pineapple slices is a relatively infeasible way to eliminate methanol. So we suggest that after painting the wall, people should use water to absorb methanols released.

References

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