Absorb! Materials suitable for restroom

Nanase Hara, Manami Sakai, Yuriko Yamauchi, Mizuki Shu, Masahiro Yamamoto, Tomoya Nagai, Takeru Ni

1st grade, Science Course, Hyogo Prefectural Kobe High School



We were wondering whether we could keep public and station lavatories, which are not cleaned regularly, as clean as possible. So we decided that we would research the relationship between the materials of walls and the degree to which they absorb a smell.

Why did we pay attention to walls and materials? Because, on 13/9/2018, P&G announced that the release of smell molecules which were produced when using lavatories and absorbed by walls regularly made materials smelly.

The announcement shows there is a deep relationship between the materials of walls and a smell, so we focused on them.

The materials we used

Clear plastic bag of 45L, packing tape, petri dish, 200ml beaker, measuring cylinder, inflator (198mL/time), tweezer, micropipette, glass rod, glue, acrylic board (4cm \times 4cm), iron sulfide, 35% hydrochloric acid, phenolphthalein solution, sodium hydroxide aqueous solution (1.0 mol/L), distilled water.

- Wall samples -









Glass







• Mortar

· Wallpaper (pattern) · Diatomaceous earth · Chaff wall



Method

- Preparation -

(1)Cut the samples in to $4 \text{cm} \times 4 \text{cm}$, then paste them on an acrylic board.

②Put samples and petri dish with 0.25mg iron sulfide into clear plastic bags. After that, close clear bags with packing tape. ③Make a hole in the plastic bags and pump 29.7L of air into it. Put 12µL of HCl solution in a petri dish quickly by using a micropipette.

④Leave these experimental systems for three days in the same environment.



- Experiment -

①Take samples left for three days from the plastic bags, and soak them in 200mL-beakers in which 100ml distilled water has been placed.

②Take out samples from the beakers and add a drop of Phenolphthalein solution to each beaker.

3 Add NaOH solution drop by drop with a micropipette to each beaker.

④Take pictures every time you add a drop of NaOH solution, and measure each color(RGB) with "ibis Paint".⇒Result I ⑤Repeat this step until there is no change of color.

⇒Result I



Tile • Glass⇒Smooth surface makes adhered hydrogen sulfide soluble in water.

Wood(cypress)⇒It easily absorbs hydrogen sulfide because it has a structure with many cavities. hydrogen sulfide tends to dissolve easily since water easily permeates.

Diatomaceous earth • Chaffwall⇒Although it is a structure with many cavities like trees, it is thought that water did not penetrate and melted out.

- Reflective points -

• To reduce the error, use a measuring flask instead of a graduated cylinder.

- · Make the same thickness of the materials.
- Increase the number of experiments.

- Future prospects -

So far we focused on absorption only. We will also examine the release of hydrogen sulfide. And considering both absorption and release, we would like to consider which material is suitable for restrooms.

Works Gited

- Ministry of Health, Labour and Welfare [About anoxia and hydrogen sulfide toxication] https://www.mhlw.go.jp/new-info/kobetu/roudou/gyousei/anzen/dl/040325-3a.pdf
- Otakuma newspaper of economy [study about restrooms by P&G] otakei.otakuma.net/archives/2018091409.html
- Eco high-tech Corporation [study result about absorption] www.eco-hi.jp/jyousui/jyousui 1 3.html