

Grade VI: Chemistry in Everyday Life: Soap

1. **Objective:** To understand the process of soap preparation and the cleaning effect of soaps
2. **Learning Outcomes:**
 - 2.1. Students will be able to understand the cleaning mechanism of soaps by exploring the concepts of “like dissolves like”.
 - 2.2. Students will be able to differentiate between different types of soaps based on properties like lather formation and cleaning effect
3. **Pre Requisite:**
 - 3.1. Students should be aware about the uses of soaps.
 - 3.2. Students should understand physical and chemical change
 - 3.3. Arrangement of atoms/molecules in solids, liquids & gases
 - 3.4. Students should be aware of the science behind solubility.
4. **Teacher Note:**

As suggested by the 7E model (elicit, engage, explore, explain, elaborate, evaluate, extend) we have tried to include most of the aspects into the module.

The pre requisites are required to understand this module, the pre requisites are being covered in Term I “*Matter around us*”. So we try to recap the concepts studied in term I so that all the students are on the same page.

The first demonstration is to try and understand the students understanding and what they know, after the demo, we help students come to the conclusion that there are two types of substances: water loving and water hating. The students are asked to observe the solubility of the substance added. At every step of the demonstration we ask students to predict the outcome, and we collect the information from them by vote (raise of hand), ensure all the students are participating. This is a form of evaluation where we get a rough sense of the number of students who know about the solubility of substances.

Sample questions: how many of you think salt will dissolve in oil raise your hands.

In the activity 1, Each group consist of 3 members and half of the groups get coconut oil and half of them get castor oil to prepare soap. We help students prepare soap, the chemistry behind the process of preparation is not relevant at this grade level, but this would help build a flavour for lab work. If required, concepts of physical and chemical change can be revised here.

We can ask students their rationale of choosing a soap, why they prefer one brand over the other etc. We conclude the discussion by focussing on the effect of soap and not the fragrance or colour that is important.

In the activity 2 we try to compare the lather forming and cleaning effect of soaps. The students should observe the level of foam generated and the extent to which the stains are removed. Before explaining the soap action, we encourage students to hypothesis how the cleaning would be happening, according to them, we give hints if necessary (sample questions below), by using the demonstration used earlier, then we explain the cleaning effect of soap. The cleaning effect of washing soaps will be higher than the bathing soap, as bathing soap has to take into account the pH of the skin, it cannot be as corrosive as washing soap. We conclude the discussion by reaching to a conclusion that washing soap and bathing soaps have different applications and hence the properties are different.

Sample questions flow to elicit cleaning effect of soap

How does the soap clean?

What did we mix in to prepare soap? A: oil

So if our stain is made up of oil what will happen? (we can ask the students to recall the demonstration)

Sample questions flow to elicit difference between washing and bathing soap

Q. As we saw washing soap has better cleaning property so then why don't we use it to clean our bodies?

A: it does not have good smell etc.

Q. if washing powder has good smell, will you take bath using it?

A: No

Teacher: what can possibly happen if we use washing soap on our body? How does our hands feel after using washing soap? Rough? Dry?

5. **Demonstration 1: Like dissolves like**

5.1. Aim: To elicit from students that there are two types of materials one is water loving and the other is water hating.

5.2. Materials Required: (50ml) water, (500ml) oil, common salt (5g), sugar (5g), wax (5g), kerosene (5ml), 27ml Test tubes (8).

5.3. Procedure:

First we mix the oil (10ml) and water (10ml) to show that they do not mix with one another (**fig. 1**).

Next we take a total of 8 test tubes, fill 10ml of oil in 4 test tubes and 10ml of water in the other 4 test tubes.

We take the 4 substances and add each substance to a test tube and let the students observe for any residues or precipitate.

Similarly, we repeat the above step but by mixing the substances in test tubes filled with oil and let the students observe for any residues or precipitate.



fig.1 oil water separation

6. **Activity 1: Soap making**

6.1. Aim: To prepare a bar of soap using natural oil (coconut and castor oil)

6.2. Materials required:

Sodium hydroxide solution (0.2 N), coconut oil (100ml), castor oil (100ml) matchbox (20), candle (10), glass rod (50), 27ml Test tube (40), Vanilla essence (25ml), coffee powder (50g)

6.3. Procedure:

6.3.1. Mix the 0.2N NaOH solution (10ml approx.) to 5ml of natural oil (Coconut and castor oil) taken in a test tube and stir it until an emulsion is formed (**fig. 2**).



fig.2 emulsion formation

- 6.3.2.If the emulsion is not formed, using the candle heat the mixture and continue to stir.
6.3.3.After stirring for 1min add the fragrance and colour to the mixture.
6.3.4.After the emulsion is formed, transfer the content to a matchbox and let it cool.

7. Activity 2: Analysing different soaps

7.1. Aim: To compare the lather formation and cleaning effect of different soaps in the market.

7.2. Materials Required: different brands of soap (Hamam, Cinthol, sunlight, Dettol, surf), Test tubes (30), water (1L), pickle oil (20ml), paint strainer (20ml) blotting paper (10) ice cream sticks.

7.3. Procedure:

The below test will be done for two different soap (out of the 6 soap any two must be given.).

Test 1: Lather power.

We take a known amount of the soap in a test tube (1 spatula full) with some amount of water. Then we shake the test tube by closing the lid for 10 sec. then observe the length of the foam in the test tube.

Test 2: Cleaning power.

Take the blotting paper mounted on an ice cream stick (fig.1) and put one drop of the stain on it, then put this inside the test tube for 30 sec. then remove the paper and wash it under water and see the change.

Repeat the same process by using a different stain (paint strainer).

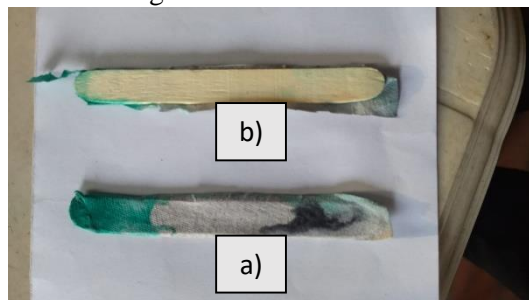


fig.3 filter paper mounted on ice cream sticks a) front view b) back view

Image Source

Fig.1: <https://www.shutterstock.com/image-photo/olive-oil-on-water-test-tube-159071306>

Fig. 2: <https://www.soapqueen.com/bath-and-body-tutorials/cold-process-soap/free-beginners-guide-to-soapmaking-cold-process/>