

## Slime, or polymer cross-linking

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### Data dodania:

19.06.2018

### Słowa kluczowe:

glutek, masa plastyczna, polimery, sieciowanie, slime

### DZIEDZINA:

Chemistry, Sensor technology

### Cel doświadczenia:

The purpose of the experiment is to prepare a stretchy plastic material as a result of cross-linking of a polymer, i.e. polyvinyl alcohol. Another purpose of the experiment is to make club members familiar with the phenomenon of cross-linking and the change in properties of the cross-linked materials. The modelling dough that will be prepared as the final effect of the task additionally develops creativity and manual skills.

### Spis materiałów:

1. contact-lens solution or washing liquid (containing boric acid)
2. soda
3. a food colour
4. glitter
5. transparent glue, water-soluble (containing PVA)
6. a bowl
7. a tablespoon

### Etapy realizacji:

#### Experiment 1.

1. Pour approx. 250 mL glue into the bowl and add a few drops of colour (to dye the glue), optionally some glitter (for visual effect). Mix all the ingredients together.
2. Add a tablespoonful of baking soda and mix.
3. Observe the consistency of the dough obtained.
4. Then add 3-4 spoons of lens solution in portions. After each addition mix the dough and observe how its consistency changes.
5. When the dough comes off the sides of the bowl, knead it for a minute.

(You can reduce the amounts to produce less dough).

#### Experiment 2.

1. Pour approx. 50 mL glue into the bowl and add a few drops of colour, optionally some glitter. Mix all the ingredients together. Observe the consistency of the dough obtained.

Then add washing liquid in portions, one spoonful at each time. After each addition mix the dough and observe how its consistency changes.

**Pytania do doświadczenia:**

1. Why do we initially observe lower viscosity of the mass?
2. How do the properties of the mass change after each addition of lens solution/washing liquid?

**Opis zjawiska:**

**Ciekawostki:**

1. The cross-linking process is also taken advantage of in molecular cuisine for making so-called molecular caviar from sodium alginate and using calcium chloride. In the presence of divalent calcium cations, the long chains of alginate take the cross-linked form (calcium forms bridges between the chains), which leads to the formation of a water-insoluble gel.
2. Vulcanisation is a process of cross-linking molecules of a polymer (natural rubber) leading to obtaining rubber. But vulcanisation is also used in tyre recycling which consists in replacing the tread on worn tyres. The new layer of tread is glued using the phenomenon of cross-linking.