

Activity Instructions

The following items will be needed for this activity:

per group:

- 4 test tubes (30 mL)
- 2 graduated cylinders (10 mL)
- 20 mL graduated cylinder
- thermometer
- thermometer clamp
- grease pencil
- 2 large beakers
- 2 clamp stands
- 3 test tube clamps
- hot plate
- balance
- test tube stand

per class:

- crushed ice
- sodium hydroxide (NaOH)
- zinc acetate (ZnAc)
- water
- UV lamp
- sulfuric acid
- isopropanol
- safety gear

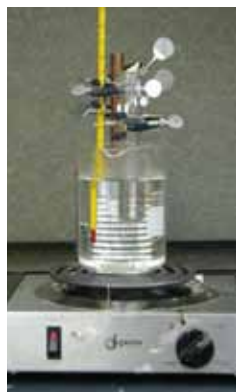


Figure 2

Steps 1 to 4 can be done simultaneously by different members of the group.

Step 1

Clean the test tubes and graduated cylinders with water and then rinse them with a small amount of isopropanol.

Step 2

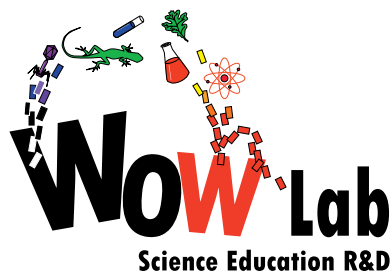
Prepare an ice bath by mixing crushed ice and water in a large beaker (**Figure 1**). Place a clamp stand near the ice bath and attach two test tube clamps to the stand.



Figure 1

Step 3

Prepare a hot water bath by filling a second large beaker with water and placing it on a hot plate (**Figure 2**). Keep the water temperature between 60°C and 65°C by setting the hotplate on a low setting. While the water is warming, set up a clamp stand next to the water bath and attach a test tube clamp and a thermometer clamp to the stand. Place the thermometer in the thermometer clamp and submerge the tip in the water. Ensure the thermometer does not touch the sides or bottom of the beaker. If the bath does not reach the required temperature, gradually increase the temperature setting on the hot plate.



a WOW Lab

BLUEPRINT

Quanta of Colour - Activity Instructions

Step 4

Using a grease pencil, label one test tube as "heated" and another as "unheated". Label the other two test tubes as "NaOH stock" and "ZnAc stock". Label one 10 mL graduated cylinder as "NaOH" and the other as "ZnAc".

Step 5

Place 50 mg of sodium hydroxide in the test tube labelled "NaOH stock" and 50 mg of zinc acetate in the test tube labelled "ZnAc stock".

Step 6

Use the 20 mL graduated cylinder to pour 20 mL of isopropanol into the "NaOH stock" test tube and 20 mL of isopropanol into the "ZnAc stock" test tube. Swirl the solution to dissolve the solute. Note that not all of the solid will dissolve.

Step 7

Place the "NaOH stock" and "ZnAc stock" test tubes into the ice bath for five minutes.

Step 8

After the stock solutions have cooled for five minutes, pour 5 mL of the ZnAc stock solution into the test tube labelled "heated", using the appropriate graduated cylinder. Pour 5 mL of the NaOH stock solution into the same test tube. Ensure that none of the solid residue is transferred. Swirl for approximately 10 seconds to ensure proper mixing.

Step 9

Place the "heated" test tube in the hot water bath.

Step 10

Repeat Step 8 using the test tube labelled "unheated". Place this test tube into the ice bath. The stock solutions can now be returned to the test tube stand.

Step 11

After five minutes have elapsed, place the "heated" and "unheated" test tubes in the test tube stand.

Step 12

Turn off the lights and close the blinds. Point the UV lamp at the test tubes and turn it on. Ensure that the UV lamp is not pointed at anyone and keep hands covered. Note any colour differences. **Figure 3** shows what happens when the UV light is shone on the heated test tube.

Step 13

Add a small amount of sulfuric acid to the solutions and then dispose of them appropriately, according to the school's guidelines.

Step 14

Rinse the glassware with sulfuric acid and then rinse again with water.

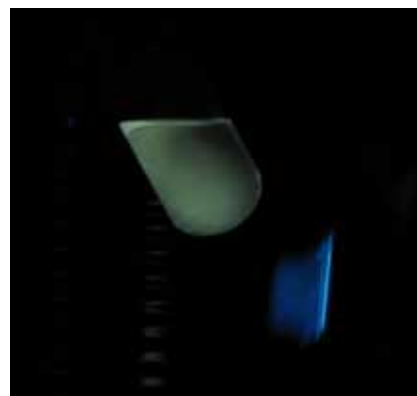


Figure 3