





The 3 Rs and the Products of the Future



Experiment: Step 1









Safety first: put on a lab coat, protective goggles and gloves.









- Cut the PLA cup into small pieces using scissors. The smaller the pieces are, the faster the reaction will be.
- Place the PLA pieces into a weighing boat.
- Measure 5 g of PLA pieces on a digital scale.













Add 5 g of PLA pieces into the 250 mL Erlenmeyer flask using a funnel.









- Using the graduated cylinder, measure 100 mL of the pre-prepared solution (1.4 M NaOH in 1:1 ethanol/water).
- Add the solution and 1 magnetic stirring rod into the flask.











- Place the flask onto the hot plate.
- Turn on the heating function of the hot plate and heat the solution to 90°C (reduce the heat if the flask begins to boil vigorously).















Heat and stir the solution with a stirring rod until the PLA pieces have completely dissolved.













After the PLA pieces have completely dissolved and the solution is pale yellow, turn off the hot plate. The temperature should be 80°C – 90°C.







Experiment: Step 2









- Use heat resistant gloves to remove flask from hot plate.
- Place the flask in an ice water bath and allow the solution to cool until it is below 60°C. This mixture is now called "hydrolysed PLA".









Experiment: Step 3







- Using the plastic pipette, transfer 1-2 drops of the solution to the watch glass.
- Test the pH of the hydrolyzed PLA by dipping a pH strip in the watch glass.



This means that the pH of the solution is 14.









Slowly add 200 drops of 6 M HCl into the flask and mix.











Measure the final pH of the solution using a pH strip. Aim for a pH range of 4-5. The solution now contains lactic acid and sodium chloride (NaCl).











Using a funnel, transfer the lactic acid solution into the plastic bottle. It is now ready to use.





