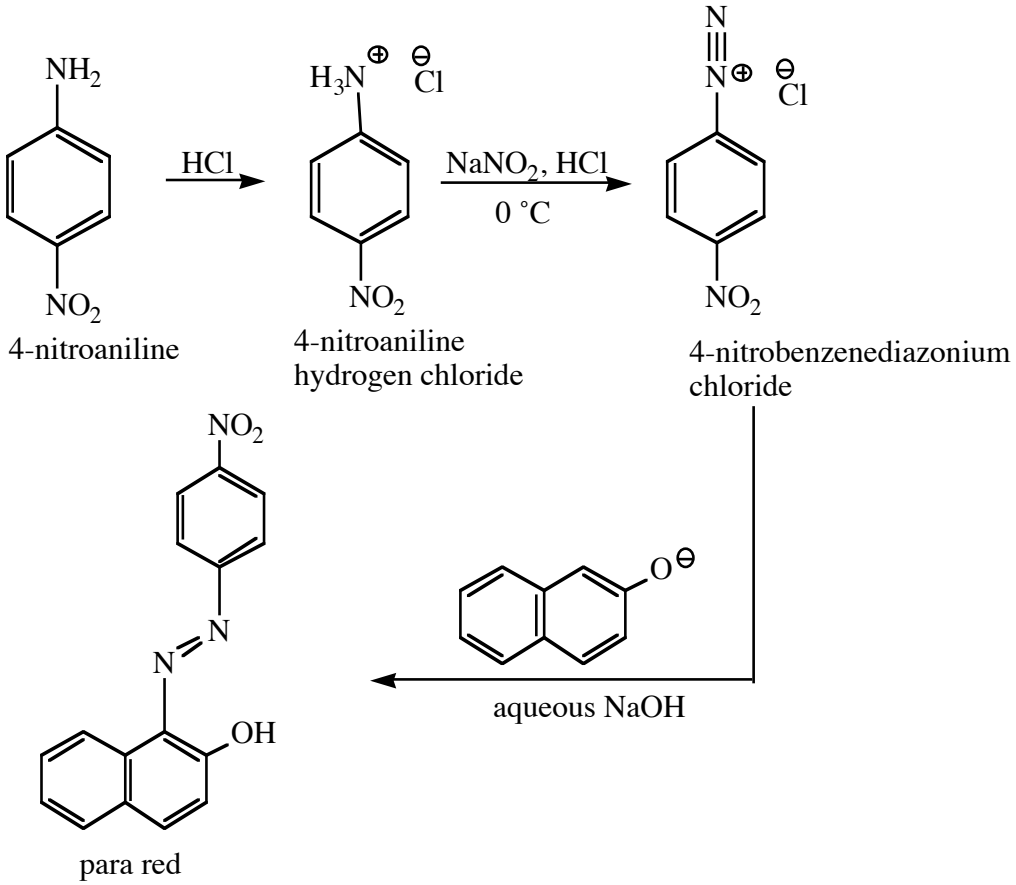
Preparation of 1-(4-nitrophenylazo)-2-naphthol (Para Red)

Reactions:



4-nitroaniline

4-nitroaniline hydrogen chloride

4-nitrobenzenediazonium chloride

para red

when neutral (after you've washed away the NaOH)

Procedure

1. Preparation of 2-naphthol solution

To 0.30 grams of 2-naphthol, add 10 mL of 2.0 M NaOH solution and 20 mL of water. Stir until all the 2-naphthol has dissolved.

Soak one piece of the multi-fabric material to be dyed in this solution for 5 minutes and then let it dry on several sheets of paper towel.

On a second piece of material (or t-shirt, or socks, or your lab partner's coat when they're not looking – no, not this last one), make a design with a pencil and on top of this design,

place the 2-naphthol solution (use a Pasteur pipet or a toothpick or some other fine device) and place your material on a paper towel to dry. The more precise you are here, the better it will look later. Stretch the material out to prevent the solution from soaking through to other parts of the material.

2. Preparation of 4-nitrobenzenediazonium chloride solution

Place 0.14 grams of 4-nitroaniline into a 30 mL beaker, add 3 mL of water and 1.0 mL of 6.0 M HCl solution. Heat the mixture to dissolve most of the 4-nitroaniline, but do not boil the solution. Cool the solution in an ice bath to about 5 ˚C (the 4-nitroaniline may crystallize) and add all at once a solution of about 0.3 grams of sodium nitrite ($NaNO_2$) in 3 mL of water. Stir vigorously to dissolve as much of the crystallized solid as possible. Add this diazonium salt solution to 50 mL of ice cold water in a 100 mL beaker.

3. Preparation of the Para Red Dye

Take the fabric on which you drew the design, and place some paper towels beneath it. Be sure to protect the other side of the shirt if you're doing a design on a t-shirt. Carefully take a long disposable pipet (or a toothpick or a paint brush or some other fine device) and skillfully place the 4-nitrobenzene diazonium chloride solution exactly where you drew the design in pencil and 2-naphthol. The dye will be made and trapped inside the fabric. The more careful you are here, the better the design will come out. After allowing 10 minutes for the dye to form and set, wash the shirt carefully. Then let it dry on some paper towels.

Take the multi-fabric cloth that you soaked in the 2-naphthol solution and place it in the 4-nitrobenzene diazonium chloride solution. After about 10 minutes, the para red dye will have formed. Remove this fabric from the solution with tweezers, wash it in water by stirring with a glass rod in a beaker, and let it dry on a paper towel.

Pour the remaining 4-nitrobenzene diazonium chloride solution into the 2-naphthol solution or vice versa. Place a second piece of the multi-fabric cloth into this mixture, stir, remove and wash with water as before. Compare this piece of material with the two other pieces of dyed material. Which one had the weakest color?