EXPERIMENT

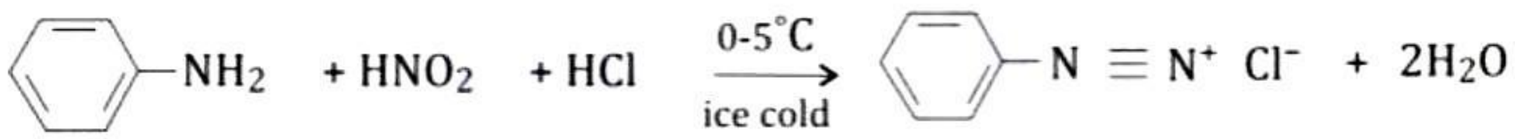
Aim

To prepare aniline yellow from aniline.

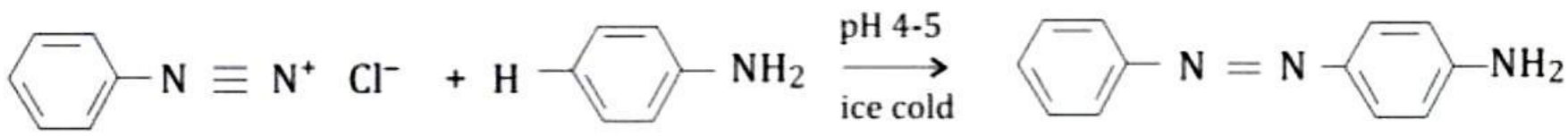
Theory

Aniline yellow is prepared by coupling reaction of benzene diazonium chloride with aniline in acidic medium between 0-5°C. Benzene diazonium chloride required for the reaction is prepared by diazotization of aniline with nitrous acid (prepared in situ by reaction of $NaNO_2$ with HCl)

$$NaNO_2 + HCl \xrightarrow[\text{ice cold}]{0-5^\circ C} NaCl + HNO_2$$



The chemical reaction is:



Material Required

Test tubes, boiling tube, beaker, measuring cylinder, filtration flask, suction pump, Buchner funnel, filter paper.

Aniline =10 ml

$NaNO_2$ = 8 g

Dil. HCl (5N) = 25 ml

Procedure

1. Dissolve 5 ml aniline in 15 ml dil. HCl in a boiling tube and cool it in the ice bath.
2. Make a solution of 8g $NaNO_2$ in 10mL H_2O and cool it in an ice bath.
3. Add $NaNO_2$ solution to the boiling tube and with shake it. Add some ice to the reaction mixture also.
4. Add the solution of benzene diazonium chloride in small amounts to the solution of 5 mL of aniline in 10 mL of HCl with constant stirring. Keep the reaction mixture cool during the reaction.
5. Filter the yellow dye using a Buchner funnel. Wash with water. Dry and weigh.

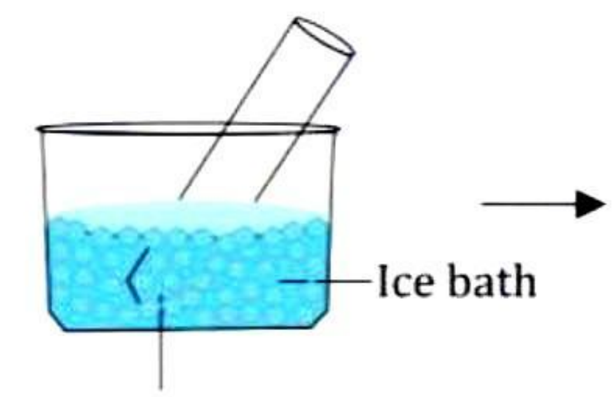


Fig.4

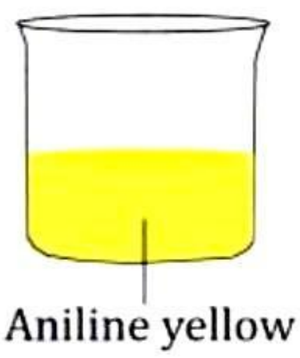


Fig.5

Result

..... g of aniline yellow is obtained, and it has a bright yellow colour.

Precautions

1. Reaction mixture should be throughout in the ice bath during diazotization and coupling.
2. The temperature should not rise above 5°C as benzene diazonium chloride decomposes above 5°C.
3. The Ph during coupling should be between 4-5.

VIVA VOCE

Q 1. What is the chemical structure of aniline?

Ans. Aniline has the molecular formula $C_6H_5NH_2$ and consists of a benzene ring with an amino (NH_2) functional group.

Q 2. Describe the process of diazotization and its role in the synthesis of Aniline Yellow.

Ans. Diazotization involves the conversion of an amino group to a diazonium ion. In the synthesis of Aniline Yellow, it is a crucial step to introduce the diazonium group for further reactions.

Q 3. Why is sodium nitrite used in the diazotization process?

Ans. Sodium nitrite serves as a source of nitrous acid (HNO_2), which is essential for converting the amino group to a diazonium ion.

Q 4. Explain the significance of maintaining a low temperature during diazotization.

Ans. Low temperature is crucial to control the reaction rate and prevent undesirable by-products, ensuring the formation of a stable diazonium ion.

Q 5. How does the addition of sodium acetate contribute to the diazotization reaction?

Ans. Sodium acetate is added to maintain an acidic medium, favoring the formation of nitrous acid and stabilizing the diazonium ion.

Q 6. What role does sulfuric acid play in the coupling reaction with β-naphthol?

Ans. Sulfuric acid helps in maintaining an acidic environment, promoting the coupling reaction between the diazonium ion and β-naphthol to form the dye.

Q 7. Why is β-naphthol chosen as the coupling component in this synthesis?

Ans. β-naphthol is selected for its ability to form a colored compound with the diazonium ion, resulting in the Aniline Yellow dye.

Q 8. What safety precautions should be taken during the synthesis of Aniline Yellow?

Ans. Safety precautions include wearing appropriate personal protective equipment (PPE), working in a well-ventilated area, and handling chemicals with care due to their reactivity.