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AIM: TO PERFORM THE SYNTHESIS OF BENZAMIDE FROM BENZOYL CHLORIDE

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Requirements

Chemicals

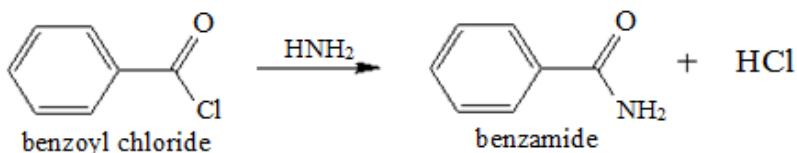
- Benzoyl chloride
- Ammonia

Apparatus

- Measuring cylinder
- Spatula
- Buchner funnel
- Round bottom flask
- Beaker
- Funnel

Theory

Ammonolysis is a reaction in which a compound is divided into two parts employing ammonia or an amine. The reaction generally carried out at high temperature above 150°C. In this reaction, ammonia acts as the nucleophile and form amides from the reaction of acid chlorides with ammonia or amines. Benzamide is a derivative of benzoic acid.



Physical Properties

1. Benzoyl chloride

- It is a colourless fuming liquid
- It possess pungent odour
- It is soluble in aqueous medium

2. Ammonia

- It is an alkaline gas
- It is very soluble in aqueous medium
- It has a pungent smell

3. Benzamide

- It is white solid.
- Its melting point is 127°C to 130°C and boiling point is 288°C.

Chemical Properties

1. Benzoyl chloride

- It is synthesized by distillation of benzoic acid and PCl_5 under anhydrous reaction conditions
- It reacts with water to afford HCl and benzoic acid.

2. Ammonia

- Ammonia and oxygen reacts to afford nitric oxide and nitrogen dioxide
- Ammonia reacts with hypochlorous acid to produce chloramine and H_2O .

3. Benzamide

- The hydrolysis of benzamide yields benzoic acid and ammonia
- It produces nitrogen oxides upon decomposition

Procedure

1. Place liquid ammonia in a 250mL conical flask fitted with the stopper.
2. To this liquid ammonia; add benzoyl chloride in small portions with continuous shaking.
3. Since it's an exothermic reaction, the flask will become warm.
4. Cool the contents with cold water.
5. After cooling, shake the reaction mixture for 15-20 minutes.
6. After the complete addition of benzoyl chloride, benzamide separates as fine flakes.
7. Filter the product using a filter paper or filtration assembly and recrystallize using cold water.
8. Finally, dry the product in a petri dish using a hot air oven.

Applications

- ✓ Benzamide and derivatives are used in organic synthesis and pharmaceuticals as building blocks and starting materials.
- ✓ The benzamide and derivatives are used for stereochemical analysis in circular dichroism technique.
- ✓ Benzoyl chloride is used in the preparation of perfume, pharmaceuticals and raisins.

Result: Benzamide was successfully synthesized using ammonia and benzoyl chloride.