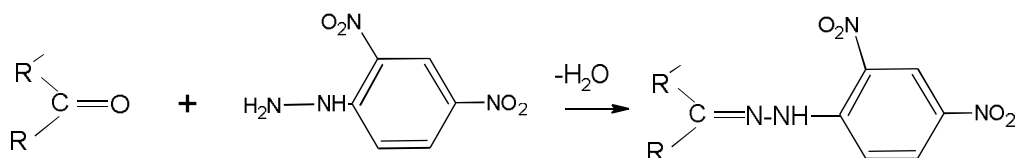**Experimental No. (14)   Derivatives of carbonyl compounds**

Derivatives of carbonyl compounds

Purpose of experimental

Preparation of 2,4-dinitrophenylhydrazone

Aldehyde : R = alkyl or aryl, R′ = hydrogen
Ketone : R = alkyl or aryl, R′ = alkyl or aryl

Theory part of experimental

carbonyl compounds (aldehydes and ketones) react with ammonia derivatives such as 2,4-Dinitrophenyl hydrazine, semicarbazide and hydroxylamine, etc. to form orange-red coloured stable products which have well defined melting points. These compounds are useful in identification and characterization of carbonyl compounds. The reaction catalyzed by protonic acids such as HCl, H_2SO_4, CH_3COOH etc. involves nucleophilic addition of the ammonia derivatives to the carbonyl carbon followed by elimination of water molecule. pH of the reaction should be maintained around 5 to 6.

Chemical and Apparatus

Benzaldehyde, 2,4-dinitrophenylhydrazine, ethanol, sulphuric acid, beaker, heater, filter paper, funnel,

**Experimental No. (14)   Derivatives of carbonyl compounds**

Procedure of Experimental

Part A: Preparation the 2,4-dinitrophenylhydrazine test reagent.

1. Weigh out 0.5 g of 2,4-dinitrophenylhydrazine and dissolve in 10 mL of concentrated sulphuric acid in a beaker.

2. Add this solution carefully to a solution of 15 mL of ethanol and 5 mL of deionised water. This gives the yellow-brown stock solution. The solution can be used for about 10 days but it gradually deteriorates as a precipitate forms

Part B: Preparation of Benzaldehyde 2,4-Dinitrophenyl hydrazone

1- In a clean and dry test tube or beaker take 2 ml of benzaldehyde. Add 10 ml of 2,4-dinitrophenylhydrazine reagent

2- Warm the contents of tube or beaker on water bath for 5 minutes and allow the tube or beaker to stand at room temperature for 5 minutes.

3- Cool the contents of tube or beaker in ice water bath when an orange-coloured precipitate of Benzaldehyde 2,4-Dinitrophenyl hydrazone will separate out.

4- Filter the product and dry it.

5- Record the yield of the product and determine the melting point of the product, (lit. 237 °C).

Mechanism:

Experimental No. (14)   Derivatives of carbonyl compounds
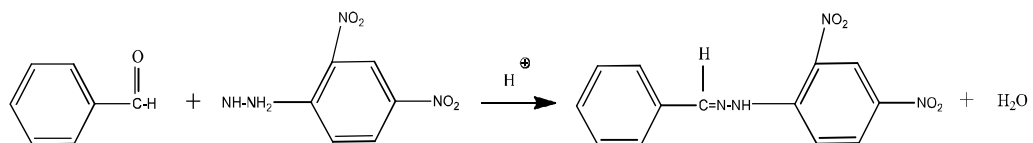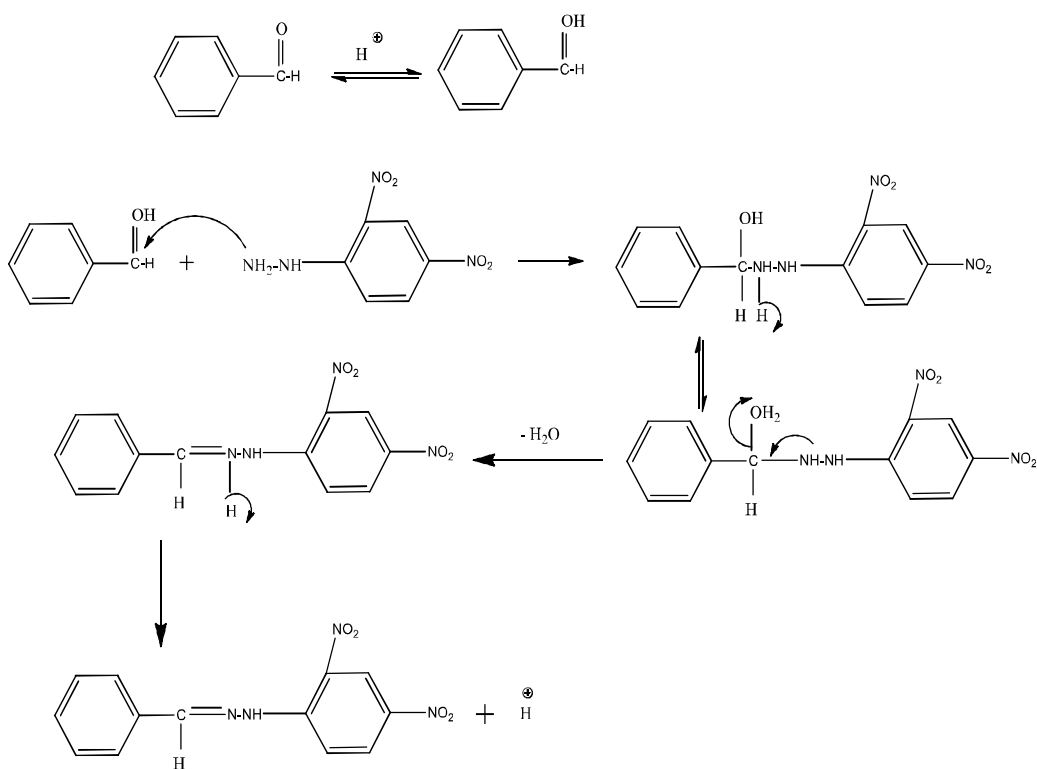
Calculation
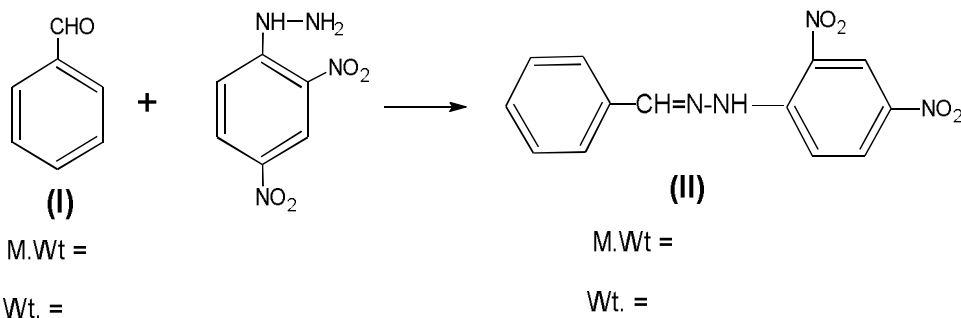
$$\text{Theoritical weight of } \textbf{(II)} \quad = \quad \frac{\text{Wt. of } \textbf{(I)} \ \textbf{X} \ \text{M.Wt of } \textbf{(II)}}{\text{M.Wt of } \textbf{(II)}}$$

$$\% \text{ of benzaldehyde 2,4-dinitrophenylhydrazone } = \frac{\text{Experimental weight of } \textbf{(II)}}{\text{Theoritical weight of } \textbf{(II)}} \ \text{X 100}$$

Questions for discussion

1. Can you write equations for any reactions occurring?
2. What is the purpose of making derivatives of unknowns?
3. Why we added the sulphuric acid in preparation of Benzaldehyde 2,4-Dinitrophenyl hydrazone
4. Which method use to purification of yield (Benzaldehyde 2,4-Dinitrophenyl hydrazone)