Lab: Reactions of Aldehydes and Ketones

Reactions of Alkanals and Alkanones

Introduction

Ethanal and propanone have been chosen as safe examples of Aldehydes and ketones to illustrate their reactions in simple test-tube experiments. Benzaldehyde has been chosen as an example or an aromatic ketone.

Materials

ethanal, propanone, benzaldehyde, 2,4-dinitrophenylhydrazine, $K_2Cr_2O_{7\,(aq)}$, $KmnO_{4\,(aq)}$, 2M H_2SO_4, Hot water-bath, hydroxylamine chloride, cyclohexanone

Safety

Ethanal, propanone and benzaldehyde are irritants to eyes, skin and lungs and are highly flammable. Therefore, you must perform experiment at a fume cupboard, keep the bottles away from flames, keep the stoppers on the bottles as much as possible.
2,4-dinitrophenylhydrazine is toxic (very poisonous), and strongly stains skin to an orange-yellow.
The stain is a cosmetic blemish and disappears within a few days.

Procedure

1. Observe the color and smell of each compound.

2. Place a few drops of benzaldehyde on a watch glass and leave in the fume hood. Note any change.

3. Into a tt, put 5 drops of ethanal, 2 drops of $K_2Cr_2O_{7\,(aq)}$ and 10 drops of dilute H_2SO_4. Shake the tt gently in the hot water-bath. Note your observations. Repeat with propanone and benzaldehyde.

4. Repeat procedure 3 using $KmnO_{4\,(aq)}$ instead of $K_2Cr_2O_{7\,(aq)}$.

5. Add $4cm^3$ of conc. H_2SO_4 to 2g of 2,4-dinitrophenylhydrazine, and then carefully add $30cm^3$ of methanol. Warm gently on a water bath until a clear solution forms, and add $10cm^3$ of distilled water.
   Add $5cm^3$ of the above solution to $1cm^3$ of ethanal. Observe any reactions. Repeat using propanone and benzaldehyde instead of ethanal.

6. Dissolve 1g of hydroxylamine chloride in $4cm^3$ of warm water containing 1.5g of sodium ethanoate crystals. Add $1cm^3$ of propanone. Observe any changes
   Repeat using cyclohexanone instead of propanone.