

Basic organic reactions

Practical Lesson on Medical Chemistry and Biochemistry


General Medicine

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Task 1: Oxidation of alcohols

Reagents:

Potassium permanganate (saturated solution) 

Schiff reagent (fuchsine decolorized by sulfur dioxide) 

Samples: The “unknown“ samples (encoded as A, B, C) are (in random order):


Methanol , 2-Propanol , *tert*-Butanol 

Procedure:


Pour about 1 ml of sample A, B, C or distilled water into 4 appropriately labelled test tubes. Add approx. 4 drops of potassium permanganate solution to each tube, mix gently and seal the tubes with a piece of tissue (Manipulation with the tissue should be performed in gloves, since your fingerprints are Schiff positive and might influence the result.). Wet the tissue with Schiff reagent. Heat the tubes in a heating block set to 90-100°C and observe color changes of both the tissue and the sample. Reaction should be visible within 5 minutes.

Task 2: Coupling reactions of diazonium salts

Reagents:

Sulfanilic acid (Diazo reagent I)  5 g/100 ml of 0.6 mol/l HCl

Sodium nitrite (Diazo reagent II)  5 g/100 ml of distilled water





















β -naphthol 2 g/100 ml of ethanol 

Procedure:

Mix 1 ml of Diazo reagent I with 5 drops of Diazo reagent II. Add solution of β -naphthol dropwise and examine the resulting color.

Task 3: Reactions of carbonyl group

Reagents:

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|---|---|
| Sodium hydroxide (2 mol/l) |  |
| Hydrochloric acid |  |
| Sodium nitroprusside |  |
| Silver nitrate (20g/l) |   |
| Ammonia (water solution) |    |
| Fehling solution I (cupric sulfate 70g/l) |   |
| Fehling solution II (sodium hydroxide 250 g/l, potassium-sodium tartrate 350 g/l) |  |
| Schiff reagent (fuchsine decolorized by sulfur dioxide) |  |
| Acetone |   |
| Formaldehyde |     |
| Acetic acid |  |
| Formic acid |  |

Procedure:

- **Legal's test**

Dissolve several crystals of sodium nitroprusside in water. Add several drops (2-3) of this solution into 0.5 ml of your sample and slowly alkalize by adding NaOH dropwise. Check the final color.

- **Fehling's test**

Prepare Fehling's reagent by mixing equal volumes of Fehling's solution I and II. Add several drops of tested sample to approx. 2 ml of Fehling's reagent, heat gently in a water bath and check the color change.

- **Tollens' test**

Prepare Tollens' reagent:

In a beaker, mix equal volumes of silver nitrate and sodium hydroxide. Silver oxide will precipitate. Add aqueous ammonia dropwise until silver oxide dissolves.

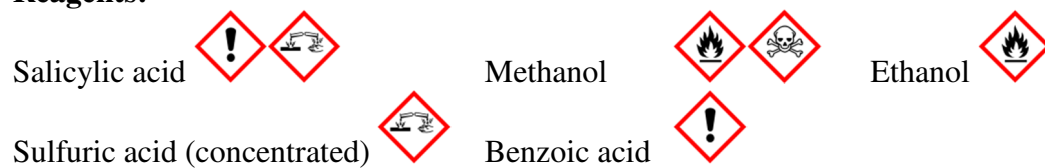
Mix approx. 1 ml of Tollens' reagent with several drops of your sample and heat in a water bath. Examine the color.

- **Schiff's test**

Add one drop of the tested sample to 1 ml of Schiff's reagent and inspect the resulting color.

Task 4: Esterification

Reagents:



Procedure:

Choose appropriate reagents to prepare either ethyl benzoate (benzoic acid ethyl ester) or methyl salicylate (salicylic acid methyl ester).

Mix approx. 0.5 g of benzoic (salicylic) acid with 1.5 ml of ethanol (methanol). Add 10 drops of concentrated sulfuric acid (**carefully!!!**) and incubate for 10 min in a water bath set to 70°C. Successful esterification can be easily monitored, since both esters have very intensive scent, which resembles that of mint. Especially the smell of methyl salicylate, predominant compound of mouthwashes, is characteristic.

Pour the whole reaction mixture in a beaker with cold water, to precipitate the ester (white crystals).