Quadrant II – Transcript and Related Materials

Programme: S.Y.B.Sc. (Chemistry)

Subject: Chemistry

Course Code: CHC 103

Course Title: Physical Chemistry and Organic Chemistry (Section B)

Unit: 03- Amino acids and Peptides

Module Name: Reactions of Amino Acids

Module No: 24

Name of the Presenter: Ms. Anuja B. Naik

Notes

Transcript of the video

Hello students, I am Ms. Anuja Naik from Ganpat Parsekar College of Education, Harmal, Pernem Goa and I will be dealing with reactions of amino acids.

The lecture deals with,

- ✓ Reactions of Amino acids.
- Esterification reaction (Ester of -COOH group)
- Acetylation reaction (Acetylation of $-NH_2$ group)
- Complexation with Cu^{+2} ions
- Ninhydrin test

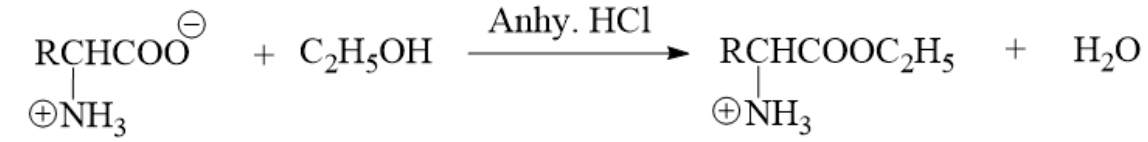
So, at the end of the lecture, the student will be able to:

- ✓ Explain the following reactions of Amino acids.
- Esterification reaction (Ester of -COOH group)
- Acetylation reaction (Acetylation of $-NH_2$ group)

- Complexation with Cu^{+2} ions
- Ninhydrin test

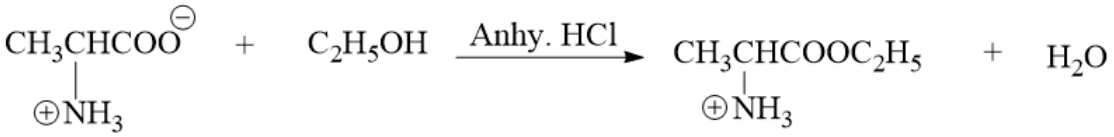
Esterification reaction (Ester of –COOH group)

✓ Amino acids can be esterified by boiling with an alcohol in the presence of anhydrous HCl.

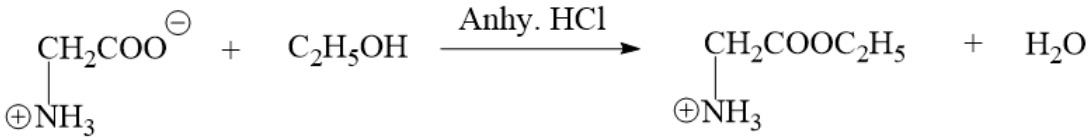


Amino acid Ester

Examples



Alanine

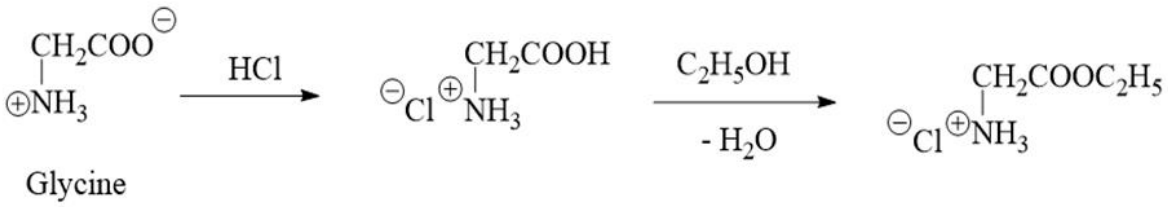


Glycine

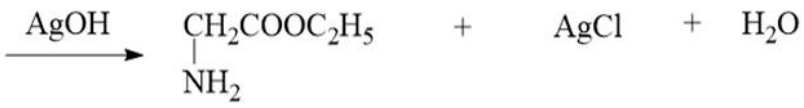
Esterification reaction

- ✓ HCl first converts the dipolar ion into an acid.
- ✓ Later, on boiling with alcohol the hydrochloride of the ester is formed.
- ✓ Finally, the free ester may be obtained by treatment with silver hydroxide (moist Ag_2O).

Example (1)

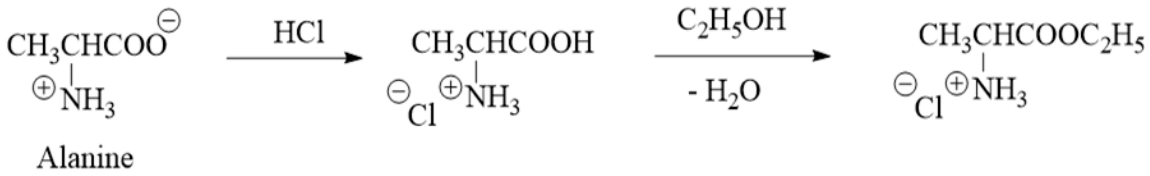


Glycine

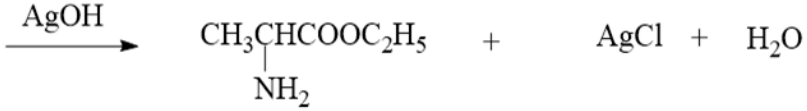


Ethyl α - aminoacetate

Example (2)



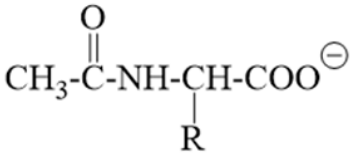
Alanine



Methyl α - aminopropionate

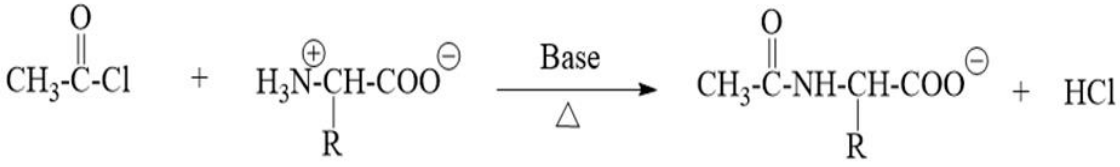
Acetylation reaction (Acetylation of -NH_2 group)

- ✓ In basic medium, the amino group of the acid reacts with acid chloride to form acetyl derivatives.



N-Acetylamino acid

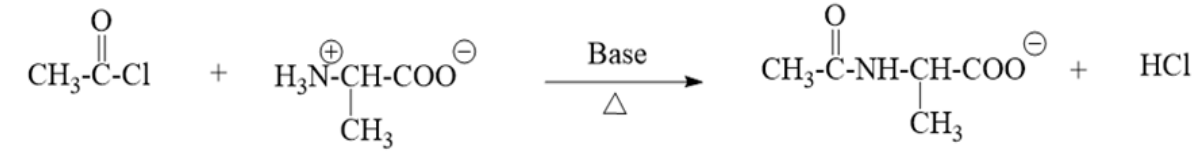
Reaction of Amino acid with Acetyl Chloride



Acetyl chloride Amino acid N-Acetylamino acid

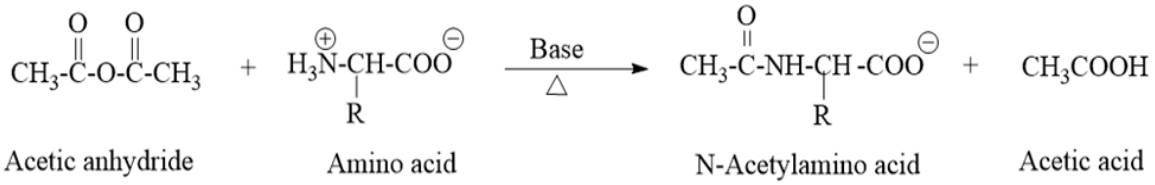
Examples

Acetyl chloride Glycine N-Acetylglycine

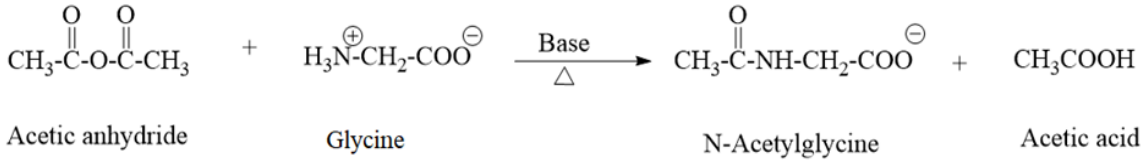


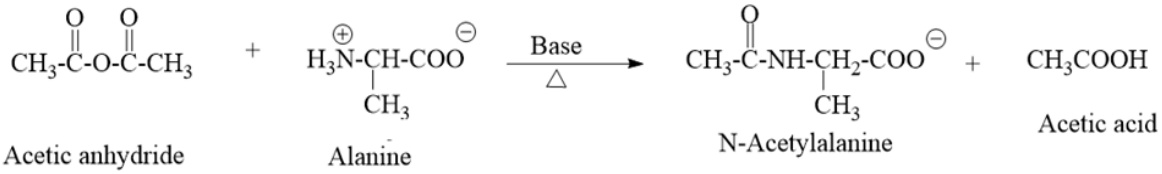
Acetyl chloride Alanine N-Acetylalanine

Reaction of Amino acid with Acetic anhydride



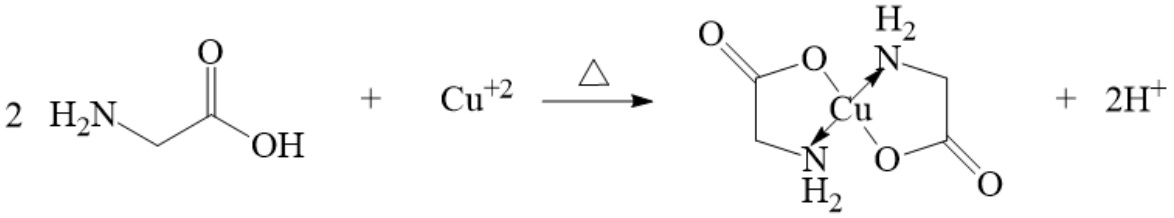
Examples





Complexation with Cu^{+2} ions

- ✓ Amino acids react with cupric oxide in water to produce deep blue complex salts



Glycine

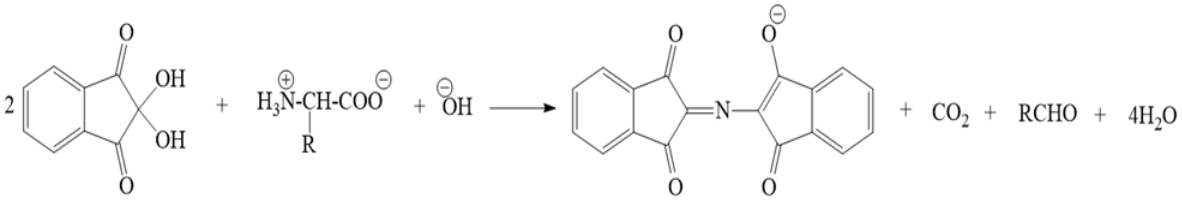
Cupric glycine

(deep blue coloured complex)

- ✓ Amino acids form high affinity complexes with copper.
- ✓ This reaction is applied for the colorimetric estimation of α- amino acids.
- ✓ It is also useful in isolation and purification of α- amino acids.

Reaction with Ninhydrin / Ninhydrin test

- ✓ All α- amino acids react with ninhydrin (triketohydrindane hydrate) to produce a purple complex or Ruhemann's purple (λ_{max} 570nm).
- ✓ This reaction is used to test the presence of α- amino acids.
- ✓ Proline and hydroxyproline do not give this test.
- ✓ Proline in which the α- amino group is secondary, gives an orange compound on reaction with ninhydrin.



Ninhydrin Amino acid Purple complex

(Ruhemann's purple)

Summary of the video (Abstract of the transcript)

- ✓ Amino acids can be esterified by boiling with an alcohol in the presence of anhydrous HCl.
- ✓ HCl first converts the dipolar ion into an acid.
- ✓ Later, on boiling with alcohol the hydrochloride of the ester is formed.
- ✓ Finally, the free ester may be obtained by treatment with silver hydroxide (moist Ag_2O).
- ✓ In basic medium, the amino group of the acid reacts with acid chloride and anhydride to form acetyl derivatives.
- ✓ Amino acids react with cupric oxide in water to produce deep blue complex salts.
- ✓ All α- amino acids react with ninhydrin (triketohydrindane hydrate) to produce a purple complex or Ruhemann's purple (λ_{max} 570nm). This reaction is used to test the presence of α- amino acids.
- ✓ Proline and hydroxyproline do not give ninhydrin test.