

KINETICS OF OXIDATION OF SOME ORGANIC SUBSTRATES

ABSTRACT

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A THESIS SUBMITTED
IN
FULFILMENT OF THE REQUIREMENT OF THE DEGREE OF
DOCTOR OF PHILOSOPHY

To



THE NORTH-EASTERN HILL UNIVERSITY
SHILLONG
INDIA

NOVEMBER, 1987



SUMMARY

1. KINETICS OF OXIDATION OF GLYCINE, ALANINE, VALINE, LEUCINE AND PHENYLALANINE BY ALKALINE HEXACYANOFERRATE (III)

The kinetics of oxidation of some amino acids (glycine, alanine, valine, leucine and phenylalanine) by potassium hexacyanoferrate (III), in alkaline medium, at constant ionic strength, under a nitrogen atmosphere, has been studied.

The rates of the reactions were found to be dependent on the first powers of the concentrations of each reactant (substrate, oxidant and alkali).

The effect of changes in temperature on the rates of the reactions has been studied, and the activation parameters have been evaluated.

Variations in the ionic strength of the medium, changes in the concentrations of added hexacyanoferrate (II) ions, and the addition of salts, did not have any effect on the rates of these reactions.

The presence of radical intermediates, formed in the rate determining step of the reaction, has been detected and characterized by ESR spectroscopy.

The reaction pathway has been mechanistically visualized as proceeding via the formation of radical

intermediates in the rate determining step. The radical underwent further reaction, by way of the imino acid, to yield the products. The products formed from the oxidation of these amino acids were the respective α -keto acids, which were characterized by chemical methods.

2. KINETICS OF OXIDATION OF SERINE AND THREONINE BY ALKALINE HEXACYANOFERRATE (III).

The kinetics of oxidation of some amino acids (serine and threonine) by potassium hexacyanoferrate (III), in alkaline medium, at constant ionic strength, under a nitrogen atmosphere, has been studied.

The rates of the reactions were found to be dependent on the first powers of the concentrations of each reactant (substrate, oxidant and alkali).

The effect of changes in temperature on the rates of the reactions has been studied, and the activation parameters have been evaluated.

Variations in the ionic strength of the medium, changes in the concentrations of added hexacyanoferrate(II) ions, and the addition of salts, did not have any effect on the rates of these reactions.

The presence of radical intermediates, formed in the rate determining step of the reaction, has been detected and characterized by ESR spectroscopy.

The reaction pathway has been mechanistically visualized as proceeding via the formation of radical intermediates in the rate determining step. The radical underwent further reaction, by way of the ionic acid, to yield the products. The products formed from the oxidation of these amino acids were the respective α -keto acids, which were characterized by chemical methods.

3. KINETICS OF OXIDATION OF CYSTEINE AND METHIONINE BY ALKALINE HEXACYANOFERRATE (III).

The kinetics of oxidation of some amino acids (cysteine and methionine) by potassium hexacyanoferrate (III), in alkaline medium, at constant ionic strength, under a nitrogen atmosphere, has been studied.

The rates of the reactions were found to be dependent on the first powers of the concentrations of each reactant (substrate, oxidant and alkali) .

The effect of changes in temperature on the rates of the reactions has been studied, and the activation parameters have been evaluated.

Variations in the ionic strength of the medium, changes in the concentrations of added hexacyanoferrate(II) ions, and the addition of salts, did not have any effect on the rates of these reactions.

The presence of radical intermediates, formed in the rate determining step of the reaction, has been detected and characterized by ESR spectroscopy.

The reaction pathway has been mechanistically visualized as proceeding via the formation of radical intermediates in the rate determining step. The radical underwent further reaction, by way of dimerization, to yield the products. The products formed from the oxidation of these amino acids were the disulfide (from cysteine) and the sulfoxide (from methionine), which were characterized by chemical methods.

4. KINETICS OF OXIDATION OF TYROSINE AND TRYPTOPHAN BY ALKALINE HEXACYANOFERRATE (III).

The kinetics of oxidation of some amino acids (tyrosine and tryptophan) by potassium hexacyanoferrate(III), in alkaline medium, at constant ionic strength, under a nitrogen atmosphere, has been studied.

The rates of the reactions were found to be dependent on the first powers of the concentrations of each reactant (substrate, oxidant and alkali).

The effect of changes in temperature on the rates of the reactions has been studied, and the activation parameters have been evaluated.

Variations in the ionic strength of the medium, changes in the concentrations of added hexacyanoferrate(II) ions, and the addition of salts, did not have any effect on the rates of these reactions.

The presence of radical intermediates, formed in the rate determining step of the reaction, has been detected and characterized by ESR spectroscopy.

The reaction pathway has been mechanistically visualized as proceeding via the formation of radical intermediates in the rate determining step. The radical underwent further reaction, by way of the imino acid, to yield the products. The products formed from the oxidation of these amino acids were the respective α -keto acids, which were characterized by chemical methods.

5. KINETICS OF OXIDATION OF GLUTAMIC ACID AND ASPARTIC ACID BY ALKALINE HEXACYANOFERRATE (III).

The kinetics of oxidation of some amino acids (glutamic acid and aspartic acid) by potassium hexacyanoferrate (III), in alkaline medium, at constant ionic strength, under a nitrogen atmosphere, has been studied.

The rates of the reactions were found to be dependent on the first powers of the concentrations of each reactant (substrate, oxidant and alkali).

The effect of changes in temperature on the rates of the reactions has been studied, and the activation parameters have been evaluated.

Variations in the ionic strength of the medium, changes in the concentrations of added hexacyanoferrate (II) ions, and the addition of salts, did not have any effect on the rates of these reactions.

The presence of radical intermediates, formed in the rate determining step of the reaction, has been detected and characterized by ESR spectroscopy.

The reaction pathway has been mechanistically visualized as proceeding via the formation of radical intermediates in the rate determining step. The radical underwent further reaction, by way of the imino acid, to yield the products. The products formed from the oxidation of these amino acids were the respective α -keto acids, which were characterized by chemical methods.

6. KINETICS OF OXIDATION OF LYSINE, ARGININE AND HISTIDINE BY ALKALINE HEXACYANOFERRATE (III).

The kinetics of oxidation of some amino acids (lysine, arginine and histidine) by potassium hexacyanoferrate (III), in alkaline medium, at constant ionic strength,

under a nitrogen atmosphere, has been studied.

The rates of the reactions were found to be dependent on the first powers of the concentrations of each reactant (substrate, oxidant and alkali).

The effect of changes in temperature on the rates of the reactions has been studied, and the activation parameters have been evaluated.

Variations in the ionic strength of the medium, changes in the concentrations of added hexacyanoferrate (II) ions, and the addition of salts, did not have any effect on the rates of these reactions.

The presence of radical intermediates, formed in the rate determining step of the reaction, has been detected and characterized by ESR spectroscopy.

The reaction pathway has been mechanistically visualized as proceeding via the formation of radical intermediates in the rate determining step. The radical underwent further reaction, by way of the imino acid, to yield the products. The products formed from the oxidation of these amino acids were the respective α -keto acids, which were characterized by chemical methods.

MS. No. 102015
Recd. by R. Nagpur 26.10.55
Class. by _____
Sub. Heading by _____
Date. by _____
Transcribed by _____