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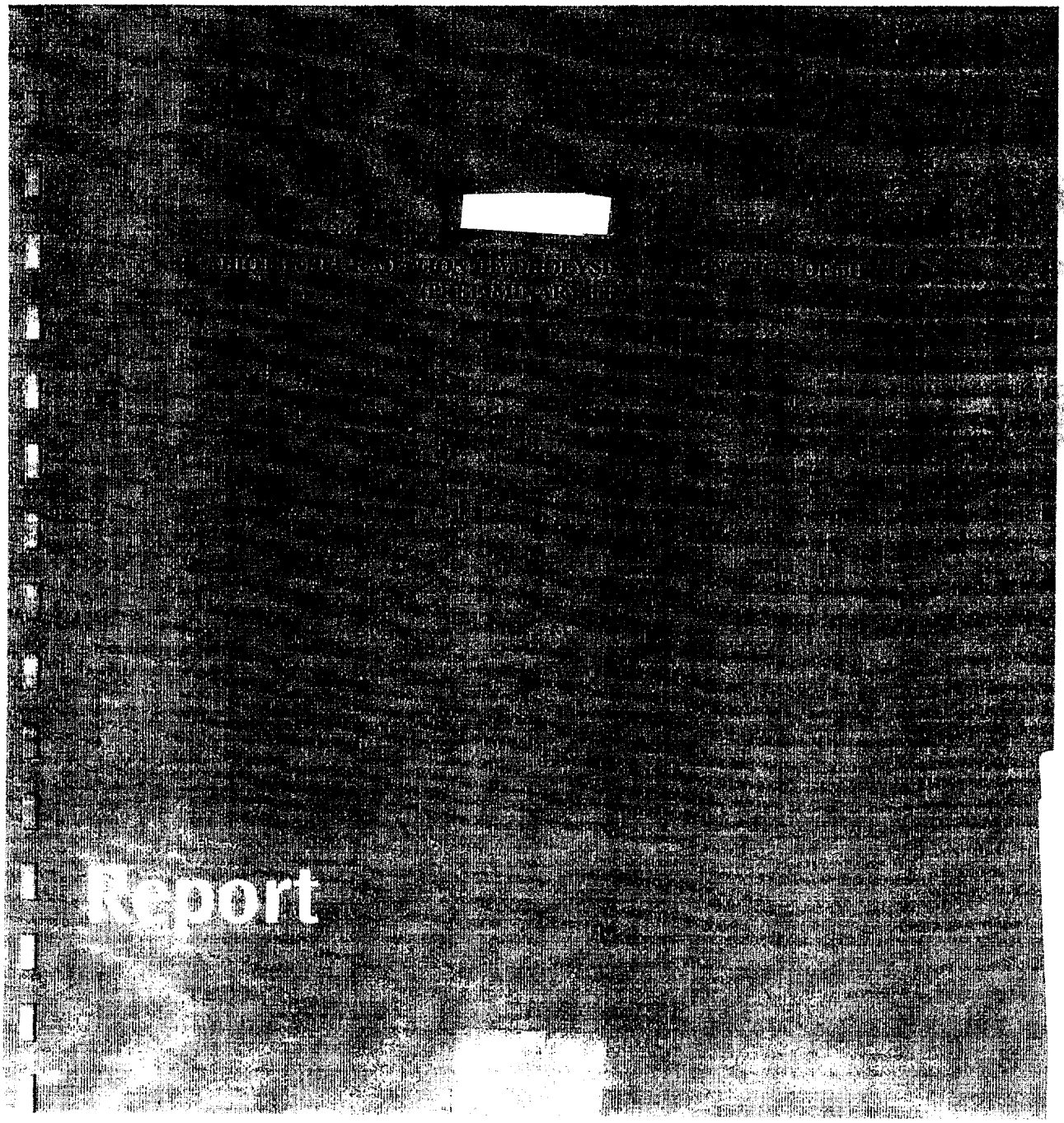

KDD003173

EID907641

ABIOTIC DEGRADATION: HYDROLYSIS AS A FUNCTION OF pH (PRELIMINARY TEST)

Sponsor

DuPont Specialty Chemicals
Jackson Laboratory
Chambers Works
Deepwater
NJ 08023
USA

Research Laboratory

Huntingdon Life Sciences Ltd
Eye
Suffolk
IP23 7PX
ENGLAND

Draft: 23 December 1998
Final: 2 February 1999

CONTENTS

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COMPLIANCE WITH GOOD LABORATORY PRACTICE STANDARDS

[redacted]

Hydrolysis as a Function of pH

The study described in this report was conducted in compliance with the following Good Laboratory Practice standards and I consider the data generated to be valid.

The UK Good Laboratory Practice Regulations 1997 (Statutory Instrument No 654).

EC Council Directive 87/18/EEC of 18 December 1986 (Official Journal No L 15/29).

OECD Principles of Good Laboratory Practice (as revised in 1997), ENV/MC/CHEM(98)17.

A. L. Comb

A. L. Comb, B.Sc., Ph.D.
Study Director
Huntingdon Life Sciences Ltd.

2 February 1999

Date

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QUALITY ASSURANCE STATEMENT

[ ]

Hydrolysis as a Function of pH

The following have been inspected or audited in relation to this study

Study Phases Inspected	Date of Inspection	Date of Reporting
Protocol	18 August 1998	19 August 1998
Process Based Inspections Hydrolysis	2 December 1998	3 December 1998
Report	15 January 1999	15 January 1999

Protocol: An audit of the protocol for this study was conducted and reported to the Study Director and Company Management as indicated above.

Process based inspections: At or about the time this study was in progress inspections and audits of routine and repetitive procedures employed on this type of study were carried out. These were conducted and reported to appropriate Company Management as indicated above.

Report Audit: This report has been audited by the Quality Assurance Department. This audit was conducted and reported to the Study Director and Company Management as indicated above.

The methods, procedures and observations were found to be accurately described and the reported results to reflect the raw data.

H. Comb, B.Sc.
Principal Auditor,
Department of Quality Assurance,
Huntingdon Life Sciences Ltd.

Date 2 FEBRUARY 1999

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RESPONSIBLE PERSONNEL

Hydrolysis as a Function of pH

The following staff member has reviewed this report.

T. C. Cowlyn, EurChem., C.Chem., M.R.S.C.
(Scientific Manager, Product Characterisation, Eye)

The following staff member was responsible for the conduct of the work and reporting of the results.

P. Woods, H.N.C.
(Scientist, Product Characterisation)

SUMMARY

The hydrolysis of [redacted] as a function of pH was studied according to EEC guidelines.

The preliminary study showed that after 5 days at pH 4, 7 and 9 and 50°C less than 10% hydrolysis had occurred, equivalent to half-life times ($t_{½}$) of greater than one year under conditions more representative of the environment (25°C).

[redacted] was found to be hydrolytically stable under acidic, neutral and basic conditions.

INTRODUCTION

The purpose of this series of tests was to investigate the hydrolytic behaviour of [redacted] as a function of pH.

The test was conducted in accordance with the OECD Guidelines for Testing of Chemicals (1981) and the requirements of the Annex to European Commission Directive 92/69/EEC.

The protocol was approved by Huntingdon Life Sciences Management on 7 July 1998, by the Sponsor on 17 July 1998 and by the Study Director on 13 August 1998.

The experimental phase of the study was undertaken between 9 November 1998 and 27 November 1998.

Location of study : Huntingdon Life Sciences Ltd
Eye
Suffolk
IP23 7PX
England

Primary data from the tests performed at Huntingdon Life Sciences and a copy of the final report are stored in the archives of Huntingdon Life Sciences.

TEST SUBSTANCE

Identity:	[redacted]
Chemical name:	[redacted]
Intended use:	Surfactant in the polymerisation of fluoromonomers
Appearance:	Pale yellow slurry
Storage conditions:	Room temperature
Lot number:	3
Expiry date:	2 years from date of receipt
Purity:	25%
Date received:	23 June 1998

[redacted] is a suspension at room temperature and separates into its component phases. Hence on sampling the test substance for use in this study, the material was warmed to 35 - 40°C in order to yield a homogenous solution.

METHODS

PRELIMINARY INVESTIGATION

Preparation of buffer solutions

Buffer solutions were prepared using the following volumes:

pH 4.0 : Disodium hydrogen orthophosphate dodecahydrate (27.6 g) and citric acid monohydrate (12.9 g) were dissolved in purified water (1900 ml). The volume was adjusted to 2000 ml with purified water.

pH 7.0 : Potassium dihydrogen orthophosphate (6.81 g) was dissolved in purified water (1900 ml), 1M sodium hydroxide (30 ml) was added and the pH was adjusted to 7.0 with 1M hydrochloric acid. The volume was adjusted to 2000 ml with purified water.

pH 9.0 : Disodium tetraborate decahydrate (33.1 g) and potassium dihydrogen orthophosphate (3.60 g) were dissolved in purified water (1900 ml) and the pH was adjusted to 9.0 with 1M hydrochloric acid. The volume was adjusted to 2000 ml with purified water.

The pH of the buffer solutions were measured using a pH meter.

PROCEDURE

Aliquots (100 ml) of each buffer solution (previously equilibrated at 50°C) were measured into reagent bottles containing [redacted] (approximately 180 mg). Due to the acidic nature of the test substance, the pHs of the resulting solutions were adjusted with 1M sodium hydroxide to within ±0.05 of the intended pH of the respective buffer. The bottles were purged with nitrogen, sealed and placed in a thermostatically controlled water bath at 50°C in the dark. They were held at 50°C until sampling was required (after short incubation period of approximately 10 minutes, and then after 2.4, 24 and 120 hours (5 days)). The water bath was monitored during the period of the test to ensure that the test temperature was maintained.

The test was performed in duplicate at each pH value.

At each sampling time portions (10 ml) of the test solutions were removed and cooled. Aliquots (1 ml) of the samples were pipetted into separate 10 ml volumetric flasks, to which purified water (6 ml) and 0.2M aqueous sodium hydroxide (0.5 ml) were added before diluting to volume with acetonitrile. The final solutions were then analysed by ion chromatography.

The pH values of the solutions were measured over the period of the test.

ION CHROMATOGRAPHY CONDITIONS

Instrument:	Dionex GP40 Pump Dionex PED-2 Pulsed Electrochemical Detector Perkin-Elmer ISS 200 Autosampler Dionex ASRS-II Membrane Suppressor
Column:	PLRP-S (25 cm x 4.6 mm internal diameter)
Column temperature:	Ambient
Mobile phase composition:	Aqueous solution containing 2mM ammonium hydroxide and 1mM sodium carbonate/ acetonitrile (75:25 v/v)
Regenerant solution	50mN aqueous sulphuric acid
Flow rate:	1 ml/min
Injection volume:	100 µl
Detector:	Conductivity mode
Retention time:	Approximately 6 minutes

The peak observed at 6 minutes corresponds to the perfluorohexylethylsulphonate ion which, from information supplied by the Sponsor, represents 92 % of the active ingredient. Consequently the levels of [ ] in the water solubility test samples will be quantified relative to this component only.

PREPARATION OF CALIBRATION

A stock calibration solution of concentration 132.5 mg/l of active ingredient was prepared by weighing test substance (106.0 mg) into a 100 ml volumetric flask and dissolving in and diluting to volume with purified water. A sub-sample (50 ml) of the stock solution was transferred to a 100 ml volumetric flask, to which 0.2M aqueous sodium hydroxide (5 ml) and purified water (20 ml) were added prior to diluting to volume with acetonitrile. Calibration solutions in the range 13.25 to 132.5 mg/l were prepared by dilutions of the final solution with mobile phase.

CALCULATIONS

The concentrations of [ ] in the analysed solutions (C_A) were calculated from standards introduced before and after samples (bracketing standards) by the following equation:

$$C_A \text{ (mg/l)} = \frac{\text{sample peak area x standard concentration (mg/l)}}{\text{mean peak area of bracketing standards}}$$

The concentrations of [ ] in the test solutions (C_t) were calculated from the following equation:

$$C_t\text{(mg/l)} = C_A \text{ (mg/l)} \times \text{dilution factor}$$