PREPARATION AND CHARACTERIZATION OF INCLUSION COMPLEXES OF β-CYCLODEXTRIN WITH 1-BUTYL-3-METHYLIMIDAZOLIUM TETRAFLUOROBORATE ([BMIM][BF_4])IONIC LIQUID

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RESEARCH REPORT SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE (ANALYTICAL CHEMISTRY AND INSTRUMENTAL ANALYSIS)

DEPARTMENT OF CHEMISTRY
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ABSTRACT

The interaction between β-cyclodextrin and ionic liquid 1-butyl-3-methylimidazolium tetrafluoroborate ([Bmim][BF_4]) had been studied. The inclusion complexation interaction was confirmed by FT-IR spectra. The inclusion complex was also characterized by 1H NMR, TGA and DSC. The results showed that the host-guest system presented a channel type structure and each glucose unit of β-cyclodextrin was in similar environment. The decomposition temperature of inclusion complex was lower than that of [bmim][BF_4] and β-cyclodextrin individually. The ratio of 1:1 inclusion complex was determined in this study.

PENYEDIAAN DAN PENCIRIAN KOMPLEKS-KOMPLEK KEMASUKAN B-CYCLODEXTRIN DENGAN CECAIR IONIK, TETRAFLUOROBORAT 1-BUTYL-3-METHYLIMIDAZOLIUM ([BMIM][BF_4])

ABSTRAK

Sifat dan interaksi di antara β-cyclodextrin dengan cecair ionik, tetrafluoroborat 1-butyl-3-methylimidazolium ([Bmim][BF_4]) telah dikaji dalam kajian ini. Interaksi komplek-kemplek kemasukan ini telah dikenal pasti melalui teknik spektroskopi FTIR. Ciri-ciri komplek-kemplek kemasukan ini juga dikaji dengan 1H NMR, TGA and DSC. Keputusan kajian ini menunjukkan sistem "*host-guest*" yang terhasil daripada interaksi ini mempamerkan struktur terowong (*channel-type*) dan setiap unit glukos yang terdapat pada molekul β-cyclodextrin berada dalam persekitaran yang sama. Suhu penguraian komplek kemasukan ini juga adalah lebih rendah daripada molekul asal bagi [bmim][BF_4] dan β-cyclodextrin. Ratio 1:1 komplek kemasukan juga diperoleh melalui kajian ini.

UNIVERSITI MALAYA

ORIGINAL LITERARY WORK DECLARATION

1) Name of Candidate : Norashikin bt Othman

2) I/C Nu. : 850216-11-5458

3) Name of Degree : MSC Analytical Chemistry and Instrumental Analysis

4) Title of Project/Research Report/Dissertation/Thesis ("this Work") :

Preparation and characterization of Inclusion Complexes of β-Cyclodextrin with 1-butyl-3-methylimidazolium tetrafluoroborate ([Bmim][BF_4])Ionic Liquid

5) Field of study :Supramolecular and Analytical Chemistry

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ACKNOWLEDGEMENT

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LIST OF ABBREVATIONS

CD	Cyclodextrin
CDs	Cyclodextrins
IL	Ionic Liquid
ILs	Ionic Liquids
IC	Inclusion Complexes
°C	Temperature
1H NMR	Proton-Nuclear Magnetic Resonance
NMR	Nuclear Magnetic Resonance
DSC	Differential Scanning Calorimetry
FTIR	Fourier Transform Infra Red
TGA	Thermogravimetric Analysis
UV Vis	Ultra Violet-Visible Spectroscopy
XRD	X-Ray Diffraction

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