

CHAPTER V

CONCLUSION

The heterocyclic conducting polymer, polypyrrole, polythiophene and poly(3-methylthiophene) were synthesized by using the chemical method.

It was found that there were five effects i.e., reaction temperature, concentration of FeCl_3 solution, reaction time and solvent affected on their conductivity. It seemed that the oxidation potential of the solution would be able to give the polymer with the desired conductivity. Furthermore, the type of heterocyclic conducting polymer also exhibited different condition. The most suitable conditions for the synthesis of each polymer with the highest conducting when 1.00 ml of monomer is used were, as follow:

polypyrrole:

Highest electrical conductivity	:	133.02 Scm^{-1}
Reaction temperature	:	0 $^{\circ}\text{C}$
Concentration of FeCl_3	:	2.5 M
Volume of solution	:	20 ml
Reaction time	:	20 min
Solvent	:	methanol
Range of oxidation potential	:	587-642 mV
The best oxidation potential	:	608 m

polythiophene:

Highest electrical conductivity	:	5.20×10^{-5}	Scm^{-1}
Reaction temperature	:	0	$^{\circ}\text{C}$
Concentration of FeCl_3	:	2.8	M
Volume of solution	:	20	ml
Reaction time	:	15	min
Solvent	:	acetonitrile	
The best oxidation potential	:	1350	mV

poly(3-methyl)thiophene

Highest electrical conductivity	:	5.19×10^{-2}	Scm^{-1}
Reaction temperature	:	room	
Concentration of FeCl_3	:	2.8	M
Volume of solution	:	20	ml
Reaction time	:	30	min
Solvent	:	acetonitrile	
Range of oxidation potential	:	950-1350	mV
The best oxidation potential	:	1350	mV

It was believed that, the electrical conductivity of these polyheterocyclics were influenced by a variety of factors such as polymer chain length, nature and amount of dopants and the heteroatom incorporated into the π -conjugated system. This was due to the influence of the band gap. Furthermore, it was found that there were many effects to decrease stability of the conductivity of synthesised conducting polymer such as high temperature,

acid/base treatment and moisture . These polymers should thus be kept in a sealed package under O_2 , N_2 gas or in a desiccator in order to impede the charge decay. However, they were thermal stability by means of electrical conductivity measurement and weight loss more than polyacetylene .



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