

**IONIC CONDUCTIVITY OF FABRICATED
CARBOXYMETHYL CELLULOSE SOLID POLYMER
ELECTROLYTE WITH AMMONIUM NITRATE**

NAJAH AMANI BINTI AHMAD JAMRI

**BACHELOR OF SCIENCE (Hons.) CHEMISTRY
WITH MANAGEMENT
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

JANUARY 2024

ACKNOWLEDGEMENT

First and foremost, praises to God, the Almighty for His showers of blessings and ease my journey in completing the journey successfully. I would like to extend my deepest gratitude to my supervisor, Madam Syuhada Mohd Tahir for guidance, and advise me patiently through all the stages of writing my final year project.

In addition, I would like to express my gratitude to my parents for their endless support, understanding, and continuous encouragement. My parents constant encouraging words, belief in my abilities and wise judgement has assisted me in completing this final year project. Special thanks to my friends and everyone that have been a part of my journey in this final year project. The knowledge that was shared and opinions given on my writing, analysis and actions had led me to continue writing this report. Moreover, their support and willingness to offer a hand have been cherished and appreciated in making my writing report to be more manageable and endurable.

In conclusion, I am thankful from the bottom of our heart to the individuals mentioned above and everybody that directly or indirectly played a part in making this report successful. The mental support, physical aid, enlightenment, and guidance that I receive are truly appreciated.

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ABSTRACT

IONIC CONDUCTIVITY OF FABRICATED CARBOXYMETHYL CELLULOSE SOLID POLYMER ELECTROLYTE WITH AMMONIUM NITRATE

Solid polymer electrolyte (SPE) has been established as an alternative for liquid electrolyte because it is safer, more stable, and easier to use. SPE consist of inorganic salt and polymer host. Carboxymethyl cellulose (CMC) is suitable as bio-based polymer host for bio-based SPE because it is low-cost, environmentally friendly, and renewable. Ammonium nitrate was added to CMC to enhance the ionic conductivity. The objective of this study is to observe the effect of ammonium nitrate on ionic conductivity of CMC SPE. CMC film with varied amount of ammonium nitrate was prepared using solution casting technique to get a thin film. Then, the thin film was characterized by using Electrochemical Impedance Spectroscopy (EIS), Fourier-Transform Infra-Red Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). The highest ionic conductivity achieved was 1.83×10^{-5} at 40% of ammonium nitrate. FTIR shows the complexation of AN at OH sites on CMC structure at range $3331-3176 \text{ cm}^{-1}$. SEM micrographs show the addition of AN smoothen the CMC SPE morphology. However, above 40%, the AN started to precipitate out as white spots observed. FTIR and SEM analysis justified the maximum conductivity achieved at 40% of ammonium nitrate. EDX analysis result showed increased amount of nitrogen as more ammonium nitrate added in the composition. As a conclusion, CMC-AN is a promising candidate for SPE fabrication provided further optimization is carried out.