Thermal Expansion Anomaly Ice Ih and Ice Ic using TIP4P/Ice Model

SKRIPSI

written by:
MUHAMMAD ISRO'
165090201111047

DEPARTMENT OF CHEMISTRY
FACULTY OF MATHEMATIC AND NATURAL SCIENCE
BRAWIJAYA UNIVERSITY
MALANG
2020

Thermal Expansion Anomaly Ice Ih and Ice Ic using TIP4P/Ice Model

SKRIPSI

As a requirement to obtain the degree of
Bachelor of Science in Chemistry

written by:
MUHAMMAD ISRO'
165090201111047

DEPARTMENT OF CHEMISTRY
FACULTY OF MATHEMATIC AND NATURAL SCIENCE
BRAWIJAYA UNIVERSITY
MALANG
2020

VALIDATION PAGE

Thermal Expansion Anomaly Ice Ih and Ice Ic using TIP4P/Ice Model

written by:
MUHAMMAD ISRO'
165090201111047

Following the defense in front of reviewers
on .....
and was deemed eligible to obtain the degree of
Bachelor of Science in Chemistry

Supervisor I	Supervisor II
Drs. Budi Kamulyan, M.Sc	Dr. Diah Mardiana, MS
NIP. 19630619 199002 1 001	NIP. 19630529 19910 3 002

Head of Chemistry Department
Faculty of Mathematic and Natural Science,
Brawijaya University

Masruri, S.Si.,M.Si.,Ph.D.
NIP. 19731020 200212 1 001

NO-PLAGIARISM STATEMENT

Name : Muhammad Isro'
NIM : 165090201111047
Department : Chemistry

Author of skripsi with title:
Thermal Expansion Anomaly Ice Ih and Ice Ic using TIP4P/Ice Model

I have read the regulation regarding to plagiarism act, and to the best of my knowledge this report is based on my own work, all sources have been properly acknowledged, and the writing contains no plagiarism.

Malang, Januari 2015

Muhammad Isro'
165090201111047

Thermal Expansion Anomaly Ice Ih and Ice Ic using TIP4P/Ice Model

ABSTRACT

Water has more than 88 anomaly ...

Keywords: NTE, water anomaly, ...

Anomali Ekspansi Termal Es Ih dan Es Ic dengan model TIP4P/Ice

ABSTRAK

Air memiliki banyak anomali ...

Kata kunci: NTE, anomali air, ... , ...

PREFACE

....

Malang, Juni 2020

Author,

TABLE OF CONTENT

TITLE PAGE i
VALIDATION PAGE ii
NO-PLAGIARISM STATEMENT iii
ABSTRACT iv
ABSTRAK v
PREFACE vi
TABLE OF CONTENT vii
LIST OF FIGURES viii
LIST OF TABLES ix

1 INTRODUCTION **1**
1.1 Background 1
1.2 Problems Identification 1
1.3 Limitation of the Problems 1
1.4 Research Aims 1
1.5 Research Benefits 1

2 LITERATURE REVIEW **3**
2.1 Anomaly Water 3
2.2 Ice Ic and Ih 3
2.3 Expansion Thermal 3

3 RESEARCH METHODOLOGY **5**
3.1 Duration and Location 5
3.2 Equipment 5
3.3 Research Steps 5
3.4 Potential models 5

4 RESULTS AND DISCUSSION **7**
4.1 Initial Configuration 7

5 CONCLUSION AND RECOMMENDATION **9**
5.1 Conclusion 9
5.2 Recommendation 9

BIBLIOGRAPHY **11**

APPENDIX **12**

LIST OF FIGURES

LIST OF TABLES

3.1 Potential parameter for TIP4P/Ice water model. 5

CHAPTER 1

INTRODUCTION

1.1 Background

Here is you write background of your research ... ...

1.2 Problems Identification

Based on the description above, the following problems can be identified:

1. Problems ...
2. ...

1.3 Limitation of the Problems

The following limitation will be assumed in this work:

1. content...
2. content...

1.4 Research Aims

The aims of this research are:

1. content...
2. content...

1.5 Research Benefits

....

CHAPTER 2

LITERATURE REVIEW

2.1 Anomaly Water

Water has unique properties, such as [1] ...

2.2 Ice Ic and Ih

Many several polimorph of ice structure, including ...

2.3 Expansion Thermal

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Duration and Location

...

3.2 Equipment

...

3.3 Research Steps

...

3.4 Potential models

Table 3.1: Potential parameter for TIP4P/Ice water model.

Model	Position	q (e)	σ (Å)	ε/κ (K)
TIP4P/Ice	H	+0.5897		
	O		3.1668	106.1
	M	-1.1794		

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Initial Configuration

.....

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

....

5.2 Recommendation

BIBLIOGRAPHY

[1] Victor F Petrenko and Robert W Whitworth. ***Physics of Ice***. 2010.

APPENDIX

A Flow Chart

sksksks
hik hik hik

B Apa lagi ya ...