

**USING A FOUR-TIER DIAGNOSTIC TEST TO ANALYZE
STUDENTS' MISCONCEPTIONS ABOUT DIFFUSION AND
OSMOSIS**

RESEARCH PAPER

Submitted as Requirement to Obtain Degree of *Sarjana Pendidikan* in
International Program on Science Education (IPSE) Study Program



Arranged by:

Humaira Nabila Achmarini Pongoh

NIM 1903967

**INTERNATIONAL PROGRAM ON SCIENCE EDUCATION
FACULTY OF MATHEMATICS AND SCIENCE EDUCATION
UNIVERSITAS PENDIDIKAN INDONESIA**

2023

Using a Four Tier-Tier Diagnostic Test to Analyze Students' Misconception about Diffusion and Osmosis

Oleh

Humaira Nabila Achmarini Pongoh

Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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MISCONCEPTIONS ABOUT DIFFUSION AND OSMOSIS**

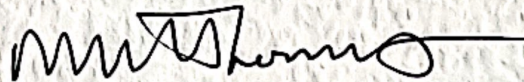
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Humaira Nabila Achmarini Pongoh

1903967

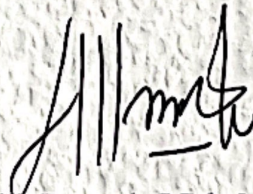
Approved:

Supervisor I



Mary Margaret Thomas, M.Sc., Ph.D.

Supervisor II



Dr. Lilit Rusyati, S.Pd., M.Pd.
NIP. 198704202012122001

Preceived by:

Head of Science Education Study Program



Prof. Dr. Ida Kaniawati, M.Si.
NIP. 196807031992032001

DECLARATION

I do hereby declare that every aspect was written in this research paper entitled "Using A Four-Tier Diagnostic Test to Analyze Students' Misconceptions About Diffusion and Osmosis" is the original result of my idea, efforts, and works without copying or plagiarizing from other papers. The theories, opinions, and others that are contained in this paper have been quoted or referenced based on scientific code from UPI and under scientific ethics that applies in scholarly society. This declaration is created truthfully and mindfully. Unless it is eventually considered to be a violation of scientific ethics, or whether there is a statement by the other to the authenticity of this research paper. I can accept the authorization of scholars or copyright that are found. Hence, I am willing to take responsibility and accept academic sanctions corresponds to the rules.

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1903967

ACKNOWLEDGEMENTS

Praise and gratitude the author prays to the presence of Allah SWT that always bestows mercy and grace so that the writer can finish this thesis. Writing this thesis is inseparable from the help, guidance, and various parties' support. Therefore, the author expresses his gratitude and appreciation to:

1. Mary Margaret Thomas, M.Sc., Ph.D. the first supervisor who has provided guidance, advice, patience, and direction to the author so that this research paper is completed.
2. Dr. Lilit Rusyati, S.Pd., M.Pd. as the second supervisor who has provided support, guidance, patience, and motivation to the author so that he can complete this research paper.
3. Prof. Dr. Ida Kaniawati, M.Si. as the head of Science Education Study Program and Dr. Eka Cahya Prima, S.Pd., M.T. as the secretary of Science Education Study Program who always support and provide the best for the study program.
4. Dr. Lilit Rusyati, S.Pd., M.Pd. as an academic supervisor who has provided input, guidance, and motivation during lectures.
5. All lecturers, laboratory assistants, and IPSE study program administrators (Ms. Eliyawati, Ms. Rika, Ms. Diana, Ms. Lilit, Ms. Margi, Mr. Eka, Mr. Nanang, Mr. Ikmanda, Ms Resik, Ms. Dhea, and Mr. Lathief) thanks for all the knowledge, support, assistance, motivation, and appreciation for the authors and all my colleagues in the class of 2019.
6. To my beloved parents, thank you for the endless support, love and support that has never faded while I was studying. Words cannot describe how valuable your role is in giving me encouragement and confidence.
7. Sabrina caca, my beloved sister. Thank you for always providing support, being a mood booster, and always helping and accompanying us until now.
8. All of KBK Assessment's friends (Mira, Nola, Ama, Shofa, Rahma, Umi, and Dicky). Thank you for fighting together, always helping, and, providing support.
9. All my friends at IPSE 2019, tipsiiii, clique, bunii, and others thank you for all the support, help, enthusiasm, prayers, and everything during our four years together.

10. The school and students involved in this research, thank you for giving me the trust and opportunity to do research.
11. And thank you as much for myself, for surviving in enjoying the long process of my thesis. Having gone through various obstacles both in the process of making it, the revision process, and the reseach proposal defense until the end of the process. Hopefully this thesis will be my best work, and motivate me to learn more and make other works.

USING A FOUR-TIER DIAGNOSTIC TEST TO ANALYZE STUDENT MISCONCEPTIONS ABOUT DIFFUSION AND OSMOSIS

Humaira Nabila Achmarini Pongoh

International Program on Science Education

humairan21@upi.edu

ABSTRACT

The processes of diffusion and osmosis are fundamental concept in science lesson. However, some students find these concepts challenging to grasp, leading to misconceptions. In Indonesia, research on misconceptions related to osmosis and diffusion is rare, most likely because of only a few junior high schools include these topics in their curriculum. This study aims to identify the level of students' conceptions, misconceptions, and the causes of misconceptions related to diffusion and osmosis through a four-tier multiple-choice test and interviews. In this study, a survey design was used to collect data. The research sample consisting of 55 students in secondary year 1 and 64 students in secondary year 3. The results showed that 62.1% of students demonstrated lack of knowledge, 24.1% had scientific knowledge, 6.5 % had misconceptions, 4.4% had false positives, and 2.7% had false negatives. Even though the level of students' misconceptions was not significant (<10%), there were still misconceptions in the students' understanding of diffusion and osmosis. The findings of this study indicate that the main misconceptions are related to understanding the direction of movement of water molecules in the osmosis process and mistakenly classifying diffusion as active transport. Based on the interview, misconceptions can arise due to wrong or incomplete understanding, wrong intuition, and not meaningful learning. Therefore, efforts are needed to overcome misconceptions in science learning, especially about diffusion and osmosis. Further research at various levels of school and with different sample is required to overcome misconception and improve students' understanding.

Keywords: Diffusion and Osmosis, Four-tier test, Misconception, Students' conception

MENGGUNAKAN TES DIAGNOSTIK EMPAT TINGKAT UNTUK MENGANALISIS MISKONSEPSI SISWA TENTANG DIFUSI DAN OSMOSIS

Humaira Nabila Achmarini Pongoh

International Program on Science Education

humairan21@upi.edu

ABSTRAK

Proses difusi dan osmosis merupakan konsep dasar dalam pelajaran IPA. Namun, beberapa siswa menemukan konsep-konsep ini menantang untuk dipahami, yang menyebabkan kesalahpahaman. Di Indonesia, penelitian tentang miskonsepsi terkait osmosis dan difusi masih jarang, kemungkinan besar karena hanya sedikit sekolah menengah pertama yang memasukkan topik ini ke dalam kurikulum mereka. Penelitian ini bertujuan untuk mengidentifikasi tingkat konsepsi siswa, miskonsepsi, dan penyebab miskonsepsi terkait difusi dan osmosis melalui tes pilihan ganda empat tingkat dan wawancara. Dalam penelitian ini, desain survei digunakan untuk mengumpulkan data. Sampel penelitian terdiri dari 55 siswa kelas 2 dan 64 siswa kelas 3 SMP. Hasil penelitian menunjukkan bahwa 62,1% siswa kurang pengetahuan, 24,1% memiliki pengetahuan ilmiah, 6,5% miskonsepsi, 4,4% *false positive*, dan 2,7% memiliki *false negative*. Meskipun tingkat miskonsepsi siswa tidak signifikan (<10%), masih terdapat miskonsepsi pada pemahaman siswa tentang difusi dan osmosis. Temuan penelitian ini menunjukkan bahwa miskonsepsi utama terkait pemahaman arah pergerakan molekul air dalam proses osmosis dan keliru mengklasifikasikan difusi sebagai transpor aktif. Berdasarkan wawancara, miskonsepsi dapat muncul karena pemahaman yang salah atau kurang lengkap, intuisi yang salah, dan pembelajaran yang tidak bermakna. Oleh karena itu, diperlukan upaya untuk mengatasi miskonsepsi dalam pembelajaran IPA khususnya tentang difusi dan osmosis. Penelitian lebih lanjut di berbagai jenjang sekolah dan dengan sampel yang berbeda diperlukan untuk mengatasi miskonsepsi dan meningkatkan pemahaman siswa.

Kata Kunci: Difusi dan Osmosis, Konsepsi siswa, Miskonsepsi, Tes Pilihan Ganda Empat Tingkat

TABLE OF CONTENTS

APPROVAL SHEETS.....	i
DECLARATION.....	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT.....	v
TABLE OF CONTENTS	vii
LIST OF TABLES.....	ix
LIST OF FIGURES.....	x
LIST OF APPENDICES	xi
CHAPTER I INTRODUCTION	1
1.1 Background	1
1.2 Research Problem.....	3
1.3 Operational Definition.....	3
1.4 Limitation of Problem	5
1.5 Research Objective.....	5
1.6 Research Benefit.....	5
1.7 Organizational Structure of Research Paper.....	6
CHAPTER II LITERATURE REVIEW	8
2.1 Students' Conception of Science	8
2.2 Students' Misconceptions in Science	9
2.3 Four-Tier Test as Diagnostic Instrument	13
2.4 Content Analysis of Diffusion and Osmosis in The National Middle School	15
2.4.1 Diffusion	17
2.4.2 Osmosis.....	20

CHAPTER III RESEARCH METHOD	24
3.1 Research Design	24
3.2 Participants	24
3.3 Research Instrument	25
3.3.1 Validation Test	28
3.3.2 Reliability Test	34
3.4 Data Analysis.....	35
3.5 Research Procedure	38
CHAPTER IV RESULTS AND DISCUSSION	41
4.1 Student Conception Levels in Diffusion and Osmosis Topic.....	41
4.2 Students' Misconceptions on Diffusion and Osmosis Topic	55
CHAPTER V CONCLUSION, IMPLICATIONS, AND RECOMMENDATION	66
5.1 Conclusion.....	66
5.2 Implications	67
5.3 Recommendation.....	67
REFERENCES.....	69
APPENDICES	74
AUTOBIOGRAPHY	127

LIST OF TABLES

Table 2.1 The Cause of Misconception and How to Overcome It.....	11
Table 2.2 Content Overview About Diffusion and Osmosis Topic	15
Table 3.1 Participant Distribution.....	25
Table 3.2 Question Distribution.....	26
Table 3.3 Sample Question.....	26
Table 3.4 The Result of Validation Test.....	29
Table 3.5 Criteria for Validity using the Aiken Index.....	32
Table 3.6 The Result of Aiken Test.....	33
Table 3.7 Result of Reliability Test	35
Table 3.8 Comparison of Decision of Four-Tier Test	36
Table 4.1 Percentage of Students' Conceptions of Diffusion and Osmosis	45
Table 4.2 Comparison of The Number of Students and Percentage in Each Level of Students' Conception Between Secondary One and Three Students.....	52

LIST OF FIGURES

Figure 2.1 Four-Tier Test Question Example	15
Figure 2.2 Diffusion Process	18
Figure 2.3 Osmosis Process	20
Figure 3.1 Research Procedure Flowchart	40
Figure 4.1 Percentage of All Student Responses in Each Conception Level	41
Figure 4.2 Percentage of Students' Misconception on Diffusion and Osmosis ...	56
Figure 4.3 Question Number 2 and Recap of Students' Responses	57
Figure 4.4 Question Number 11 and Recap of Students' Responses	60
Figure 4.5 Question Number 8 and Recap of Students' Responses	62

LIST OF APPENDICES

Appendix A.1 Four-Tier Test on Diffusion and Osmosis Instrument Before Validity Testing	75
Appendix A.2 Four-Tier Test on Diffusion and Osmosis Instrument After Validity Testing	101
Appendix B.1 Validity Test Result Testing I (N=32)	110
Appendix B.2 Validity Test Result Testing II (N=72).....	111
Appendix B.3 Reliability Test Result Testing I.....	113
Appendix B.4 Reliability Test Result Testing II	113
Appendix B.5 Distribution of r-Table	113
Appendix B.6 Aiken’s Test Result	115
Appendix B.7 Students’ Response	116
Appendix C.4 Approval from Supervisor	117
Appendix C.1 Expert Judgement Form	118
Appendix C.2 Permission Letter from Faculty	121
Appendix C.3 Permission Letter from School	121
Appendix C.4 Approval from Supervisor	122
Appendix C.5 Journal Upload Proof.....	122
Appendix D.1 Online Instrument.....	124
Appendix D.2 Research Documentation.....	126

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