



REPUBLIC OF INDONESIA DEFENSE UNIVERSITY

**COMPARATIVE ANALYSIS OF THE PERFORMANCE OF
MAGNESIUM-TEFLON-VITON (MTV) & ALUMINIUM-
TEFLON-VITON (ATV) FLARES**

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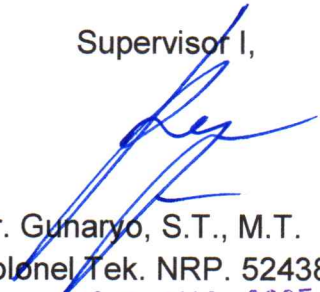
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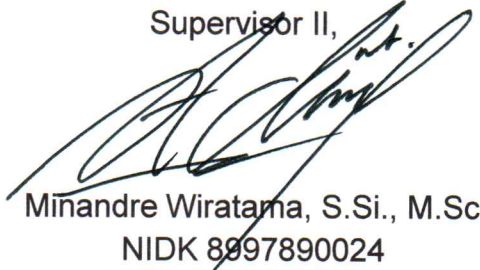
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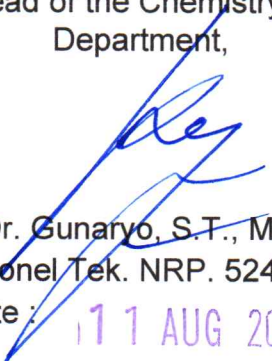

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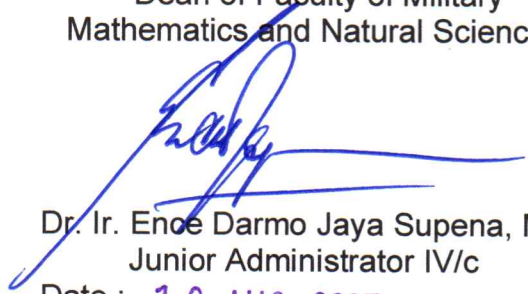

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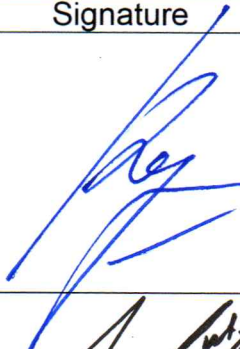
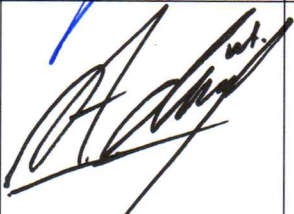

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PREFACE

Bismillaahirrahmaanirrahim. All praise and gratitude we offer to Allah SWT who has granted us guidance and His blessings so that we could complete this undergraduate thesis manuscript titled 'Comparative Analysis of the Performance of MTV & ATV Flares' within the specified timeframe. We also extend our thanks for guidance and support from various parties involved in completing this final task :

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We hope that this undergraduate thesis can provide understanding and benefits and can be used appropriately in all fields, especially in the development of chemistry and natural sciences.



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ABSTRACT

COMPARATIVE ANALYSIS OF THE PERFORMANCE OF MAGNESIUM-TEFLON-VITON (MTV) & ALUMINIUM- TEFLON-VITON (ATV) FLARES

The development of effective pyrotechnic flare compositions is critical for advancing indigenous defense capabilities. This study presents a comparative analysis of two formulations, Magnesium-Teflon-Viton (MTV) and Aluminium-Teflon-Viton (ATV) to evaluate their suitability for application in decoy systems within Indonesia's defense sector. Key performance indicators, including luminosity, combustion temperature, burn rate, and spectral color distribution, were assessed through controlled laboratory experiments. The MTV composition demonstrated superior luminous intensity, reaching up to 3572.5 lux, alongside broader spectral color output, indicating enhanced visibility and potential effectiveness in visual signaling applications. Conversely, the ATV composition exhibited higher average burn rates, peaking at 5.55 g/s, which suggests greater combustion efficiency and faster energy release, advantageous for time-sensitive deployments. Both systems maintained comparable combustion temperatures, with variations attributed to compositional differences in fuel-metal interactions and binder behavior. These findings underscore the trade-offs between brightness and combustion kinetics inherent in flare formulation and offer critical insights into optimizing material selection for mission-specific applications. The study contributes to the strategic objective of reducing dependency on imported defense materials by harnessing locally available resources and enhancing domestic pyrotechnic innovation.

Keywords : ATV, Burn Rate, Colour Distribution, Luminosity, MTV, Pyrotechnics, and Temperature Measurement

ABSTRAK

ANALISIS PERBANDINGAN PERFORMA FLARE MAGNESIUM-TEFLON-VITON (MTV) & ALUMINIUM-TEFLON-VITON (ATV)

Pengembangan komposisi flare piroteknik yang efektif merupakan aspek krusial dalam meningkatkan kapabilitas pertahanan dalam negeri. Studi ini menyajikan analisis komparatif terhadap dua formulasi, yaitu Magnesium-Teflon-Viton (MTV) dan Aluminium-Teflon-Viton (ATV), guna mengevaluasi kesesuaiannya untuk diaplikasikan pada sistem umpan (decoy) dalam sektor pertahanan Indonesia. Indikator performa utama seperti intensitas cahaya, temperatur pembakaran, laju pembakaran, dan distribusi spektral warna dianalisis melalui eksperimen laboratorium yang terkontrol. Komposisi MTV menunjukkan intensitas cahaya yang lebih tinggi, mencapai 3572,5 lux, serta keluaran warna spektral yang lebih luas, yang mengindikasikan visibilitas yang lebih baik dan potensi efektivitas yang tinggi untuk aplikasi sinyal visual. Sebaliknya, komposisi ATV menunjukkan laju pembakaran rata-rata yang lebih tinggi, dengan puncak 5,55 g/s, yang mencerminkan efisiensi pembakaran yang lebih baik dan pelepasan energi yang lebih cepat, bermanfaat untuk penggunaan dalam kondisi yang membutuhkan respons waktu cepat. Kedua sistem menunjukkan temperatur pembakaran yang sebanding, dengan variasi yang disebabkan oleh perbedaan komposisi dalam interaksi logam bahan bakar dan perilaku bahan pengikat. Temuan ini menyoroti adanya pertukaran antara kecerahan dan kinetika pembakaran yang melekat dalam formulasi flare, serta memberikan wawasan penting untuk optimalisasi pemilihan material sesuai kebutuhan misi. Studi ini berkontribusi terhadap tujuan strategis dalam mengurangi ketergantungan pada material pertahanan impor dengan memanfaatkan sumber daya lokal dan mendorong inovasi piroteknik dalam negeri.

Kata Kunci : ATV, Distribusi Warna, Laju Bakar, Luminositas, MTV, Pengukuran Temperatur, dan Piroteknik

LIST OF CONTENTS

UNDERGRADUATE THESIS APPROVAL PAGE.....	ii
UNDERGRADUATE THESIS VALIDATION PAGE. Error! Bookmark not defined.	
ORIGINAL STATEMENT	4
PUBLICATION APPROVAL SHEET	5
PREFACE	6
ABSTRACT.....	8
LIST OF CONTENTS.....	10
LIST OF FIGURE	12
LIST OF TABLE	13
LIST OF ATTACHMENT	14
CHAPTER I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Research Problems.....	3
1.3 Research Purposes.....	3
1.4 Research Advantages.....	4
CHAPTER II LITERATURE REVIEW	5
2.1 Basic Theory	5
2.1.1 Flare	5
2.1.2 Oxidizer Polytetrafluoroethylene (PTFE) / Teflon	6
2.1.3 Magnesium (Mg) powder	7
2.1.4 Aluminium (Al) powder	8
2.1.5 Binder Viton	10
2.1.6 Acetone Solvent	11
2.1.7 Temperature Measurement	12
2.1.8 Luminosity Measurement.....	13
2.1.9 Burn rate.....	14
2.1.10 Colour Distribution Analysis using ImageJ software	15

2.2	Results from Previous Research.....	16
2.3	Theoretical Framework	21
2.4	Hypothesis	22
2.4.1	First Hypothesis.....	22
2.4.2	Second Hypothesis.....	22
CHAPTER III RESEARCH METHODOLOGY		23
3.1	Research Design and Method.....	23
3.2	Research Time and Place	23
3.3	Tools and Materials.....	24
3.4	Research Variable.....	25
3.5	Research Procedure	26
3.5.1	Component Preparation	26
3.5.2	Mixing and Filling.....	26
3.6	Analysis Method.....	27
CHAPTER IV RESULTS AND DISCUSSION		28
4.1	Mixing and Filling of MTV & ATV flares.....	28
4.2	Luminosity analysis of MTV & ATV flares	29
4.3	Temperature analysis of MTV & ATV flares	34
4.4	Burn rate performance analysis of MTV & ATV flares.....	38
4.5	Colour Distribution analysis.....	42
4.6	Determining the density for MTV & ATV flares.....	46
4.7	Thermochemistry analysis of MTV & ATV flares	52
CHAPTER V CONCLUSION		57
5.1	Conclusion.....	57
5.2	Suggestions.....	58
LIST OF REFERENCES		59
ATTACHMENTS		64

LIST OF FIGURE

Figure 2. 1 PTFE structure.....	7
Figure 2. 2 Viton structure.....	10
Figure 2. 3 Acetone structure.....	11
Figure 2. 4 Theoretical framework for MTV and ATV flare research	22
Figure 3. 1 Research design for observing flare performance	24
Figure 3. 2 Canister design for flare.....	26
Figure 4. 1 Average luminosity output of MTV & ATV type flares	31
Figure 4. 2 Experimental analysis of MTV & ATV luminosity	32
Figure 4. 3 Simplified energy level diagram for Mg & Al excitation	33
Figure 4. 4 Experimental analysis of MTV & ATV temperature	38
Figure 4. 5 Average burn rate output of MTV & ATV type flares.....	41
Figure 4. 6 Density relationship and its effect	50
Figure 4. 7 Face centered cubic structure of Al.....	56
Figure 4. 8 Hexagonal close-packed structure of Mg.....	57

LIST OF TABLE

Table 2. 1 MK flare performance specifications	6
Table 2. 2 Previous studies on MTV & ATV flares	17
Table 3. 1 Research schedule	25
Table 3. 2 Materials used	26
Table 3. 3 MTV / ATV flare composition	27
Table 4. 1 Luminosity measurements for MTV type flare	30
Table 4. 2 Luminosity measurements for ATV type flare	30
Table 4. 3 Flame temperatures versus pyrotechnic destination	35
Table 4. 4 Temperature measurements for MTV type flare	36
Table 4. 5 Temperature measurements for ATV type flare	36
Table 4. 6 Heat properties of Mg and Al	37
Table 4. 7 Burn rate measurements for MTV type flare	40
Table 4. 8 Burn rate measurements for ATV type flare	40
Table 4. 9 Colour distribution analysis for ATV type flare	44
Table 4. 10 Colour distribution analysis for MTV type flare	45
Table 4. 11 Density of MTV & ATV flares	49
Table 4. 12 Comparison of pyrotechnic composition types	51
Table 4. 13 Thermochemical properties of Mg and Al	54
Table 4. 14 Lattice energy of oxides and fluorides of Mg & Al	58

LIST OF ATTACHMENT

Attachment 1. Complex mixtures analysis	68
Attachment 2. Pyro valence for elements used.....	69
Attachment 3. Fuel capacity of some common binders.....	69
Attachment 4. Mixing process of MTV & ATV flares	70
Attachment 5. Scheme for flare testing	71
Attachment 6. Canister and sample of MTV & ATV flares.....	72
Attachment 7. MTV & ATV flare after curing process.....	73
Attachment 8. Temperature test results of MTV & ATV flares.....	74

