

PERMANENT REFERENCE

**PRELIMINARY INVESTIGATION ON  
MAGNETIC PROPERTIES OF ROCKS IN  
EASTERN SRI LANKA.**

BY

**LIONEL ARULRAJ RAJARATNAM.**

A RESEARCH REPORT SUBMITTED FOR PARTIAL FULFILMENT OF THE  
SPECIAL DEGREE COURSE

IN

**PHYSICS**

FACULTY OF SCIENCE,  
EASTERN UNIVERSITY, SRI LANKA.

JANUARY 1997



001-405283  
RAJ

.....  
SUPERVISOR AND  
HEAD / PHYSICS  
DR.J.C.N.RAJENDRA  
DEPARTMENT OF PHYSICS  
EASTERN UNIVERSITY,  
SRI LANKA.

.....  
CO-SUPERVISOR  
DR.N.PATHIMANATHAN  
DEPARTMENT OF PHYSICS  
EASTERN UNIVERSITY,  
SRI LANKA.

DATE: 20/01/1997

←4474  
73835

DATE: 20.01.97



**PROCESSED**  
Main Library, EUSL

## ABSTRACT

The studies on rocks from eastern Sri Lanka were designed on the hope of finding the possibility of using the local resources for scientific and other purposes. Examining the properties of physical parameters are essential in science before we think of any practical usage. In this connection the preliminary studies on magnetism were carried out on these rocks to identify the magnetic properties.

The rock samples were collected from various places in the eastern Sri Lanka. The basic magnetic properties were identified by the measurements of magnetic susceptibility and by observing the B-H curve. The suitable instrument for the measurements of susceptibility and B-H curve was constructed and tested with known samples. The results revealed that most of the samples are showing either paramagnetic or diamagnetic properties.

# Contents

---

<b>Abstract</b>	<b>1</b>
<b>Chapter 1.</b>	<b>2</b>
<b>Introduction</b>	
<b>Chapter 2</b>	<b>4</b>
<b>Background Theory</b>	
2.1) Classification of magnetic materials	4
2.1 a) <i>Diamagnetic Materials</i>	6
2.1 b) <i>Paramagnetic Materials</i>	7
2.1 c) <i>Ferromagnetic Matertials</i>	8
2.1 d) <i>Anti-ferromagnetic Materials</i>	10
2.1 e) <i>Ferrimagnetic materials</i>	10
2.2) Force exerted on the sample in the magnetic field	10
2.3) Determination of force exerted on materials	12
<b>Chapter 3</b>	<b>14</b>
<b>Methods &amp; materials</b>	
3.1) Production of uniform magnetic field	14
3.1.1) <i>Gap adjustment</i>	16
3.1.2) <i>Measuring the magnetic field</i>	16
3.1.3) <i>Measuring the force exerted on the sample</i>	19
3.1.4) <i>Observation by telescope</i>	19
3.2) Electronic balance	20
3.3) Protection from air	21
3.4) Material preparation	22
3.4.1) <i>Identification</i>	22
3.4.2) <i>Material preparation</i>	23
3.4.3) <i>Procedures of the experiment</i>	24

3.5 ) Determination of magnetic susceptibility	25
3.6) Hysteresis loop	25
<b>Chapter 4</b>	<b>27</b>
<b>Results and Discussion</b>	
<b>References</b>	<b>61</b>
<b>Appendix</b>	<b>62</b>
<i>A.1 General field equations</i>	62
<i>A.2 Symbol and units of relevant physical quantities</i>	62
<i>B.1 Raw data of Copper and Lead</i>	63
<i>B.2 Raw data</i>	64