# ASSESSMENT OF CARBON MONOXIDE (CO) LEVEL IN ENUGU COAL CITY

BY

# OWOLABI JOHN OLUSOJI REG NO: CHE / DE/ 2008 / 170

# A PROJECT SUBMITTED TO THE DEPARTMENT OF CHEMICAL ENGINEERING, FACULTY OF ENGINEERING. CARITAS UNIVERSITY, AMORJI-NIKE EMENE ENUGU

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR
THE AWARD OF BACHELOR OF ENGINEERING (B.ENG.) IN
CHEMICAL ENGINEERING

SEPTEMBER 2012

## **CERTIFICATION**

This project work "Assessment of CO level in Enugu Metropolis is hereby certified for the award of Bachelor of Engineering (B. Eng) in Chemical Engineering, Caritas University, Amorji- Nike Enugu.

<b>Head of Department</b>	Project Supervisor
Prof. J.I. Ume	Engr Ken Ezeh
Sign	Sign
Date	Date <b>External Examiner</b>
P	of. E. O. Ekumankan
	Sign
	Data

#### **DEDICATION**

'This project work is heartily dedicated to the Almighty God – The Beginning and the Ending, for His grace, mercy, favour, divine protection, provision, preservation and for His everlasting loving kindness prior to, during and after this project work and to all those who made the work a success, especially Engr & Barr.(Mrs) Jimoh Ganiyu, Engr Ken Ezeh, Mr Joseph and to all my friends for making this vision become a reality.

#### **ACKNOWLEDGEMENT**

I sincerely wish to appreciate the efforts, support, contributions, sponsorship and mentorship of Engr & Barr. (Mrs) Jimoh Ganiyu all through my studies in Caritas University and to some worthy individuals who helped me towards the completion of this project work. These include my family – Chief & Mrs David Owolabi, Past & Mrs Owolabi James, Bro Johnson & Queen, Michael, Late Moses Samson & Ruth, and most especially Prof. J.I. Ume and Engr Ken Eze, Eng (Mrs) Otegbulu, Engr (Mrs) Odinlinye, Engr Dr Mba, Engr Ugwu, Miss Chizoba, Miss Amaka. May the Almighty God continue to increase you all on every side in Jesus' name.

My longest best friend, Bro Owolabi Johnson Oluwadapomola, may God fulfill your petitions. A special companion- Miss Onuoha Hope Nkechi, I say thanks a lot. My school fathers - Pst (Arch) Bala Methuselah, Pst Walter Ndukwe 'Sons and Daughters of Zion'-Pastor Paul Audu, God'swill, Jasper, Emma Etukudo, Emma Kalu, Glory, Mama Chidinma Obi, Esther, Deborah, Lillian, Joy, Precious, Cara, Victoria, Josephine, Precious Ajuebor, Blessing Okafor, Bro Jerry, Aremu B., Olorunyomi T., Sis Mary, and a host of others, members, workers, elders and all Leaders of Pentecostal Fellowship Caritas University where I served as a pastor alongside with my Engineering pursuit, for your support, encouragement and prayers, may God place you all in strategic positions for breakthrough and exploit in Jesus' name.

#### **ABSTRACT**

Combustion of fossil fuels presents difficult environmental challenge to societies as it could degrade the environment and affect human health and quality of life as a result of air pollution generated. Vehicular emissions are major contributors to air pollution in urban areas as they contain harmful gases. In two locations of Enugu metropolis (high traffic 'Old Park' and low traffic 'Caritas University'),the levels of carbon monoxide has been investigated in order to determine its pollution status with regards to air. EL-USB-CO analyzer used for the analysis indicated variations in the levels of CO for the period of study. The results obtained revealed that the concentrations of CO in high traffic (HT) area is higher than that of low traffic (LT) and is unacceptable compared with the Federal Environmental Protection agency (FEPA) Nigeria set limit. The dispersion pattern of the pollutant showed that the extent of spreading depends on the traffic population of the area. This strongly suggests that vehicular emission contributes to the levels of carbon monoxide in the environment.

## TABLE OF CONTENTS

Title page		i
Certification page		ii
Dedication		iii
Acknowledgement		iv
Abstract		V
Table of content		vi
CHAPTER ONE	INTRODUCTION	
1.1. Background of the	e study	.1-3
1.2. Statement of prob	olem	.3-4
1.3. Justification of the	e Research.	.4
1.4. Aim and Objectiv	ves	5
1.4.1 Aim		5
1.4.2 Objectives		.5
1.5. Research Hypothe	esis	.5
1.6. Scope of Study		.5-6
CHAPTER TWO	LITERATRURE REVIEW	
2.1 Preamble		.7-9
2.2 Properties of CO		.9
2.2.1 Physical prope	erties	.10
2.2.2 Chemical prop	perties	11

2.3	Signs and symptoms of carbon monoxide	11-12
2.4	Test for Carbon (II) Oxide	13
2.5	Carbon monoxide poisoning	13
	2.5.1 Acute Poisoning	14
	2.5.2 Chronic Poisoning	14-15
2.6	Causes of Carbon monoxide.	15
2.7	Sources of carbon monoxide.	16
	2.7.1 Worldwide Emission	16
	2.7.2 EU Emission	16-17
	2.7.3 Other Sources of Carbon monoxide	17-18
2.8	Effects of carbon monoxide on human health	18
	2.8.1 Epidemiological effect of carbon of carbon monoxide	18-20
	2.8.2 Asphyxiation.	20
	2.8.3 Parkinson Disease	21
	2.8.4 Pathophysiology	21
	2.8.5 Haemoglobin	21
	2.8.6 Myoglobin.	22
	2.8.7 Cytochrome oxidase	22
	2.8.8 Central Nervous System Effect	22-23
	2.8.9 Pregnancy.	23
2.9	Diagnosis.	23
	2.9.1 Differential Diagnosis	23-24
2.10	Prevention of Carbon monoxide.	24
	2.10.1 Carbon monoxide Detection.	24
2.11	Standardization	25
	2.11.1 Recommended World Health Organization	25
	2.11.2 Recommended WHO European Guideline for air quality	25

2.12	Treatment	26
2.13	Measurement and Monitoring of CO	27
	2.13.1 Local Studies	28-29
2.14	Preparation of Carbon monoxide	29-30
2.15	Importance of CO	30
	2.15.1 Uses of CO	30
	2.15.2 Producer gas	30-31
	2.15.3 Water gas	31-32
2.16	Impacts of CO to the environment	33-34
CHA	APTER THREE EXPERIMI	ENT
3.1	Methodology	35
3.2	Sources of Air Studied.	35
3.3	Equipment used	36
3.4	Experimental Procedure	36-37
CHA	APTER FOUR RESULT AND DISC	CUSION
4.1	Tables of Result.	38-42
4.2	Test of Hypothesis	43-47
4.3	Graphical Representation	47-55
4 4	Discussion	56-57

# CHAPTER FIVE: SUMMARY CONCLUSION AND RECOMMENDATION

APPENDIX 65		
REFERENCES 60-6		60-64
5.5	B.E.M.E. (Bill Of Engineering Measurement and Evaluation)	59
5.4	Conclusion.	59
5.3	Recommendation	58
5.2	Limitation	58
5.1	Summary	58

## LIST OF TABLES

Table 1: Signs and Symptoms of Carbon Monoxide	12
Table 2: Causes of Carbon monoxide	15
Table 3: Result of the First day	38
Table 4: Result of the Second day	39
Table 5: Result of the Third day	40
Table 6: Result of the Fourth day	40
Table 7: Result of the Fifth day	41
Table 8: Result of the Sixth day	41
Table 9: Summary of the six days	42
Table 10: Bill of Engineering Measurement and Evaluation	58