BUSITEMA UNIVERSITY
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FACULTY OF ENGINEERING

DEPARTMENT OF MINING & WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

OPTIMISATION OF GOLD RECOVERY BY ADJUSTING THE CIC EXTRACTION PROCESS

(CASE STUDY: TMT-MUBENDE PLANT)

BY

ASIIMWE JONARD

BU/UG/2012/098

Email: princeasiimwe12@gmail.com,

Tel: +256784936104, +256701174988

Main Supervisor

MR. MUKIIBI IVAN

A research project report presented for partial fulfillment of the requirements for the award of the degree of Bachelors of Mining Engineering of Busitema University

June, 2016

DECLARATION

I declare that this final year project report is my very own work and that it has never been submitted, duplicated or published for any qualification however any replication or publishing of it requires my authority.

Name: Asiimwe Jonard

Signature: 

Date: 03rd | June | 2016

APPROVAL.

This project report has been submitted in for Examination with the approval of the following supervisor.

Name: **Mr. Mukiibi Ivan**

Signature.....

Date.....

ACKNOWLEDGEMENT

Most importantly, I thank God for the gift of life and ingenuity He has offered to me to accomplish and gather all the necessary knowledge to compile this final year project report.

My heart pulsates with the thrill for tendering gratitude to those persons who helped me in completion of this final project proposal.

I would like to express my gratitude and indebtedness to my supervisor Mr. Mukiibi Ivan, Mr. Nasasira Hillary and Mr. Tugume Wycliff for their kindness in allowing me to introduce the present topic and for their inspiring guidance, constructive criticism and valuable suggestion throughout the preparation of this proposal.

I am sincerely thankful to them for their able guidance and pain taking effort in improving my understanding of this proposal matter without which the fulfilment of the task would have been difficult.

I would like to convey my sincere gratitude and indebtedness to the faculty and staff members of Department of Mining and Water resources Engineering , for their help at different times.

DEDICATION

I dedicate this report to my beloved parents for the support they have contributed towards me. Am very grateful for their support and May the Almighty God reward them abundantly.

ABSTRACT

Several methods exist to recover gold from ores such as leaching, gravity concentration and flotation. Leaching by cyanide solutions or gold cyanidasation, however, has been the main metallurgical process for gold extraction for more than one century, however the increase in CIC method has greatly been picked interest by almost everyone who may wish to recover more gold than other methods like wet panning, gold washing using sluice boxes etc. However it has failed to meet the expected recovery due to the great chemistry involved in it that affects the dissolution of gold and its respective adsorption.

In reference to Mubende TMT CIC plant, the low dissolution of gold is affected by the competing copper ions which can also react with cyanide solution in almost same conditions as gold also could react to form complexes that also affects directly the final gold that could be adsorbed by the activated carbon prompting to low recovery, however this problem has been looked for measures to curb it, through increasing the cyanide concentration, varying pH,regular testing for the concentration of gold in the tailing before filled in the tanks and pretreating the tailing mix. Among the above measures from observations pretreatment of tailing mixture before cyanide leaching is carried out is the most cost effective and has an advantage of recovery of copper which can also be sold to increase on the sales of the company, reduces the consumption of cyanide solution and does not almost change the usual operating system apart from pretreatment section. The excel Programme has been used to analyse the results and solid edge used to redesign the recommended layout of the improved CIC plant.

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LIST OF SYMBOLS AND ABBREVIATIONS

CIP	Carbon in Pulp
CIL	Carbon in Leach
CIC	Carbon in Column
Na	Sodium
K	Potassium

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CHAPTER ONE: INTRODUCTION

1.0 INTRODUCTION

This chapter includes the following; background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, scope of the study which include the conceptual scope and geographical scope and finally the significance of the study.

1.1 BACKGROUND OF THE STUDY

The chemical element gold is classified as a noble metal due to its inertness to chemical reactions in non-complex media. It does, however, react with numerous reagents. It belongs to the same group as copper and silver in the periodic table and it is commonly found to be associated with these elements in rocks (Juvonen, 1999). Gold is also found in host minerals, typically such as calaverite, montbroyite and sylvanite, in varying concentrations and occurs in association with minerals, for example, sulfide and copper (Marsden and House, 1992).

The average concentration of gold in earth's crust is 0.005 g/t, which is much lower than most other metals, for example, 0.07 g of silver/t and 50 g of copper/t.
The gold content is dependent upon gold minerals as well as gold properties, for instance electrum, specific gravity 16-19.3, is a mixture of silver and gold containing 45-75 % gold (Marsden and House, 1992).

There are many possible methods to recover gold from ores such as leaching, gravity concentration and flotation. Leaching by cyanide solutions or gold cyanidation, however, has been the main metallurgical process for gold extraction for more than one century (Lima de Andrade and Hodouin, 2006).
The common leaching plants at industrial level include CIP and CIL since they have a high percentage of recovery; however CIC has received much attention in the small scale miners, to improve on the gold recovery from disposed tailings, but it has remained a challenge for **Mubende TMT CIC** plant to meet the expected recovery (Eng. Douglas site supervisor, 2015)

Since the invention of the gold cyanidation process in 1887, its chemistry and leaching kinetics have been the subjects of considerable investigation and several theories have been proposed to explain the reaction mechanism. Various variables affecting gold cyanidation,

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