بسم الله الرحمن الرحيم

قال تعالى:

"و الارض مددناها و ألقينا فيها رواسى و أنبتنا فيها من كل زوج بهيج (7) تبصرة وذكرى لكل عبد منيب (8) "

صدق الله العظيم

سورة(ق)

DEDICATION

Dedicated to:

- Our parents and families, who offer us love and fidelity
- Post graduate studies staff, mainly in mechanical engineering dept as they establish and coordinate the course of Msc in KSC site.
- Kenana engineer team (ethanol and sugar factory staff).

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ABSTRACT

Kenana Sugar Company, has always adopted a far-sighted and rounded approach to business, in keeping with this philosophy, they have diversified into other related products and services. They constantly strive as far as possible, to fully utilize all their resources both human and natural. All by-products are put to effective use in downstream utilization or value added processing, to insure that they optimize the returns on their substantial investment in kenana sugar.

The aim of this research is to evaluate and know how possible can disposal the ethanol by-products especially the vinasse.

Three cases studies to select the bestest and cheap solution of vinasse. This research has been directed towards the fermentation and distillation of ethyl alcohol (ethanol) for all sectors concerned with this product, including fuel, beverage and industrial alcohol.

The research also explores the possibility of utilizing extra molasses from some of the other Sudanese Sugar Mills to supplement the kenana mills output, or as a potential source of feedstock for a future ethanol expansion project . Various alternatives are compared, for the utilization of the spent wash or vinasse as a feedstock for further value added products, or at least to reduce the cost of disposing of this environmentally damaging effluent emanating from the fermentation and distillation.

The incineration of Vinasse after concentration and used as a boiler fuel is the best solution for disposal. With some change in the boiler burner for fuel atomization to achieve full combustion.

الخلاصـــــــة

شركة سكر كنانة تبنى دائما نظرة بعيدة فى كل مشاريعها ، الحالية و المتوقع انشاؤها مستقبلا . و تماشيا مع ه ذه الفلسفة تم تنويع المنتجات و الخدمات و إستعمال كل المصادر الطبيعية و البشرية بالاضافة الى كل المنتجات العرضية الى الإ ستعمال النهائى الفعال و بالتالى تحسين العائدات على الإستثمار الكبير فى سكر كنانة .

ان هدف البحث تقييم و معرفة أمثل الطرق للتخلص و الاستفادة من منتجات الايثانول و خاصة الفيناس .

تمت دراسة ثلاث طرق للتخلص من الفيناس لإختيار الأفضل و الأسهل والأقل تكلفة.باعتبار أن المنتجات تزداد بكميات كبيرة عند استخدام المولاص من مصانع السكر السودانية الاخرى كمادة أولية فى انتاج الإيثانول . تم دراسة كيفية تخمير و تقطير المولاص ب إعتباره إحدى مخلفات صناعة السكر من قصب السكر ثم تكوين الايثانول و معرفة إستخداماته فى كل المجالات خاصة كوقود حيوى بديل للبترول . تم دراسة منتجات صناعة الإيثانول و معرفة الأثار المترتبة على البيئة و وضع حلول علمية وعملية للتخلص منها بالاستفادة من التجارب العالمية فى ه ذا المجال.

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Abbreviation &Acronyms used

Cm	centimeter
0	degree
Dia	diameter
Hr	hour
Kg	kilogram
Kw	kilowatt
L	litter
L/d	litter per day
T	metric tone
Bbl	barrel oil =159 litters

Acronyms:

EFI	Electronic fuel injection
FFV_s	Flexible fuel vehicles
AGE	Aviation grade ethanol
BOD	Biochemical oxygen demand
COD	Chemical oxygen demand
TTS	Total suspended solids
M.C	Materials content
MADM	Mathematical anaerobic digestion model
DWG	Distillers wet grains

TDS	Total dry solids
DDGS	Distiller dried grains with soluble
VOC_S	Volatile organic compounds
M.A.S	Molasses alcohol stillage
HHV	High heating value
LHV	Low heating value
NPHR	Net plant heat rate
CIP	Cleaning implemented process
E85	Ethanol 85% blended by volume
GHG	Greenhouse gasses

International units

One ton = metric tone =1000kg

1j = 4.18 calorie

1 kW = 3.600 j

1 w = 1 j/s

M = mille $=10^{-3}$

K =kilo $=10^{3}$

M = mega$=10^{6}$

G =giga $=10^{9}$

Chemical symbols:

CO_2	carbon dioxide
CH_4	methane
CH_2OH	methanol
CH_2H_5O	ethanol
H_2O	water
C	carbon
N	nitrogen
P	phosphorus
K	potassium