

## الآية الكريمة

وَسَى لَنْ نَأْطِرَ بِفِرْلَتُمْ لِيَلِي مَطْعَامٍ وَ أَحِدٍ فَادْعُ لِنَارِ بَكَ يُخْرِجُ لِنَا مِمَّا تُنْبِتُ الْأَرْضُ  
هَهَا وَ فُوهِنَابِوْلِهَانَوَسِقَهَآلَاوَ بَصَلِهَهَا قَالِ أَتَسْتَدْبِرُونَ الَّذِي هُوَ أَذْنَى بِالَّذِي هُوَ خَيْرٌ  
بِإِنَّ لَكُمْ مَا هَسْبَاطُنِي وَمَضْرًا بَقْتِ عَلَيْهِمُ الذَّلَّةُ وَالْمَسْكَنَةُ وَ بَأُوؤُا بِرِعْضَبِ مَا لِلَّهِ ذَلِكَ  
هُمُ كَانُوا يَكْفُرُونَ بِرَأْيَاتِ اللَّهِ وَ يَقْتُلُونَ الذَّبْرِيْنَ بِرِعْيَرِ الْحَقِّ ذَلِكَ بِمَطْمَوحَاذُوا يَعْتَدُونَ {

صدق الله العظيم

سورة البقرة، الآية 61

The Dedication :

I wish more pleasure and happiness to my parents.

**My father (Usama),,,**

Whom I trust and obey and appreciate for what he has done for his family.

**My mother (Naiema)**

Whom I love, she didn't only carried and fed me when I was young ,but even protected me from any dangerous and fill my hart with happiness and love.

**My brothers (Ali and Omar) and my Sister (Zeena)**

Whom I care about their lives and wish beautiful future for them.

**My wife (Sufana),,,**

Whom I love so much and I live trying to export any moment of pleasure to her and I appreciate whatever she does for me.

**The Candidate**

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Thanks to everybody encouraged me.

**The Candidate**

## **The Abstract**

This research is trying to discuss the experimental investigation of determining the displacement efficiency of unrecoverable amount of oil using surfactant (CPL1) for a Sudanese oil field - Case study application in (CPL) center through five chapters.

The research was working on how to proof the hypothesis that says using Chemical methods of Enhanced Oil Recovery (EOR) especially surfactant flooding produces additional oil than the natural energy of the reservoir (water flooding).

The research carried out an experiment using a flooding station of the Central Petroleum Laboratory (CPL), this implementation was done to compare the displacement efficiency of the reservoir water flooding and the surfactant (CPL1).

At the end of the experiment a list of the important results and recommendation were attached.

The most important result of the research was that the surfactant (CPL1) displacement was proved successful in increasing the recovery factor of oil as well as it was cost and time efficient compared to the natural reservoir energy (water flooding), while The most important recommendation of the research was to apply this experiment on 3 – 4 plugs for more precision.

## التجريد:

يناقش البحث أثر تجربة معملية لتعيين كفاءة الإزاحة في حقول النفط السودانية باستخدام المحسن السطحي (CPL1) - دراسة الحالة (مختبرات النفط المركزية) من خلال خمسة فصول.

البحث يسعى لإثبات الفرض القائل بأن استخدام الطرق الكيميائية من بين طرق الاستخلاص المحسن باستعمال المحسنات السطحية أنها تنتج كميات إضافية من الزيت مقارنة باستخدام الطاقة الطبيعية للمكمن (الغمر بالماء).

تم إجراء تجربة معملية باستخدام محطة المحلية بالمعمل لمقارنة كفاءة الإزاحة بالاستخدام القوة الطبيعية للمكمن (الغمر بالماء) والمحسن السطحي (CPL1).

بعد الفراغ من التجربة تم الحصول على مجموعة من النتائج والتوصيات أهم النتائج هي ثبت فعالية الإزاحة باستخدام المحسن السطحي (CPL1) في استخلاص الزيت المتبقي مقارنة باستخلاص الزيت بالطاقة الطبيعية للمكمن.

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## **Abbreviations**

EOR	Enhanced Oil Recovery
IOR	Improved Oil Recovery
STOIP	Original Oil In Place
ASP	Alkali – Surfactant Polymer
SP	Surfactant Polymer
IFT	Interfacial Tension
API	American Petroleum Institute
SAGD	Steam Assisted Gravity Drainage
CPL	Central Petroleum Laboratory

## Nomenclature

$V_w$	Water volume
$V_B$	Bulk volume,
$V_G$	grains volume
$r$	radius of the plug.
$L$	Plug's length.
$S_w$	Water saturation
$V_p$	Pore volume
$\emptyset$	Porosity
$W_{sa}$	Saturated weight in the air
$W_s$	Saturated weight
$S_{or}$	Residual oil saturation