

الإستهلال

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى : [اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (1) خَلَقَ الْإِنْسَانَ مِنْ
عَلَقٍ (2) اقْرَأْ وَرَبُّكَ الْأَكْرَمُ (3) الَّذِي عَلَّمَ بِالْقَلَمِ (4) عَلَّمَ
الْإِنْسَانَ مَا لَمْ يَعْلَمْ (5)] صدق الله العظيمالآيات من (1-
5) سورة العلق.

Dedication

We would like to dedicate this project to

Our mothers

Who teach us tolerance

Our fathers

Who teach us challenging

Our brothers & sisters

Who support us in all of our life

Our teachers

Who teach us reading and writing principles

Our colleagues

Acknowledgments

First and foremost we would like express our thanks to almighty Allah on successful

Completion of this research work,

Secondly we want extend our deep appreciate and graduate to teacher Ahmed abd elaziz

For his direct supervision, guidens, kind assistance of support given to us through out

Preparation of this project. Also great thanks to teacher Abu alezz, concrete lap, (SUST).

Great thanks to petroleum training center (PTC) represented in the head Mrs. Osama

Wanacy and Mohamed abd alla ndt also for Neelane University represented in T. abd

Alsakhi Silliman Mohamed and Sudan atomic energy commission (SAEC), NDT

Department represented in head dr. babker and Mohamed basheer.

To our teachers in faculty of petroleum engineering we extend our deep thanks.

Abstract

In this research mesquite wood powder has been used as an additive to cement to reduce cement micro-cracks, it has been added to five cement samples with different percentage, after the required tests ,it has been founded that the compressive strength stay constant and equal to **5323psi** in the range recommended by (API),also the space between particles of cement stay constant equal **32.12 micrometer** and it has been founded that the sample No.(3) has the tallest length of micro-cracks equal **28 millimeter** also most number of micro-cracks have been founded in sample No.(2) and No.(3) equal to **5** so according to these results, these percentages of mesquite wood powder made the number and length of cement micro-cracks decreased after sample No.(3) although there is increasing in number and length from sample No.(1) to No.(3).

Key word: CEMENT MICRO CRAKCS, CEMENT ADDITIVS, MESQUITE POWDER,MICRO CRAKS EFFECTS IN CEMENT

التجريد

في هذا البحث تم استخدام بودرة المسكيت كماده مضافه للحد من أثر الشقوق الدقيقه في الأسمنت، حيث أضيفت الى خمس عينات من الأسمنت Class G بنسب مختلفه، وبعد إجراء التجارب اللازمه وُجد أن مقاومة الإنضغاط للأسمنت ظلت ثابتة ولم تتغير، وهي في المدى المسموح به من قبل معهد البترول الأمريكي (API)، وكانت تساوي 5323 رطل للبوصة المربعة ؛ وكذلك المسافه بين الحبيبات لم تتغير وكانت تساوي 32.12 ميكرومتر؛ كما وُجد ان العينه الثالثه سجلت أكبر طول للشقوق الموجوده وهو 28 ملم، وكذلك أكبر عدد من الشقوق وُجد في العينتين الثانيه والثالثه وكان يساوي 5 شقوق؛ وعليه من خلال هذه النتائج وُجد ان بودرة المسكيت أدت لتناقص في عدد وأطوال الشقوق الدقيقه بعد العينه الثالثه بالرغم من وجود زياده في عدد واطوال الشقوق من العينه الاولى الي الثالثه.

Table of content

Subject	Page
الإستهلال	i
Dedication	ii
Acknowledgment	iii
Abstract (English)	iv
Abstract (Arabic)	v
Table of contents	vi
List of figures	viii
List of tables	ix
Chapter 1	1
1.1. General Introduction	1
1.2. Introduction to cementing	1
1.3. Cement definition	2
1.4. Cement additives	5
1.4.1. Accelerators	5
1.4.2. Retarders	5
1.4.3. Extenders	5
1.4.4. Weighting agents	5
1.4.5. Dispersant	5
1.4.6 .Fluid-loss additives	6
1.4.7. Lost circulation control agents	6
1.4.8. Strength retrogression	6
1.4.9 .Miscellaneous agents	6
1.5. Problem statement	6

1.6. Research objectives	7
---------------------------------	---

Chapter 2	8
2.1. Cement micro-crack definition	8
2.2. Cement micro -cracks reasons	8
2.3. Well problems due to cement micro –cracks	9
2.4 .Solution of cement micro-cracks	9
2.5 .Literature review	9
2.6. Using of mesquite wood powder	10
2.6.1. Macrobiotic classification, family and gender of mesquite	11
2.6.2.Mesquite in Sudan	12
2.6.3. Benefits and Uses of mesquite	12
2.6.4. Problems Caused By Mesquite	12
2.6.5. Fighting the Mesquite	12
Chapter 3	13
3.1. Cement slurry specification	13
3.1.1. Cement classes standards	13
3.1.2 .Mixing and samples standers	15
3.2 .Samples preparation	16
3.2.1. Dray cement preparation	16
3.2.2.Mesquite wood powder Preparation	16
3.3.3. Sample preparation	18
3.3. Evaluation methods	20
3.3.1. Destructive tests(DT)	20
3.3.2. Non destructive tests (NDT)	21
Chapter 4	26
4.1. Destructive test results (DT)	26
4.1.1. Compressive strength results	26
4.2. Non destructive tests results	27
4.2.1. Easy scanning results	27
4.2.2. Ultrasonic results	30
4.2.3. Inspection radiographic results	34
4.3. Analysis and discussion	35
Chapter 5	38
5.1. Conclusions	38
5.2. Recommendations	38
References	39
Appendices	40

List of Figures

Figure	Subject	Page
(1.1)	Typical cementing process	3
(2.1)	Typical mesquite tree	11
(3.1)	Common mixing devise	15
(3.2)	Show the cement during sieving	16
(3.3)	Mesquite branches before milling	17
(3.4)	Mesquite wood powder	17
(3.5)	Typical smooth play wood	18
(3.6)	The cement sample contain additive	19
(3.7)	Show compressive strength machine	21
(3.8)	Show the easy Scan devise	22
(3.9)	Show a small sharp platinum tip used in easy Scan devise	23
(3.10)	Show the picture of atoms on computer screen	24
(3.11)	Show ultrasonic device	25
(4.1)	Show scan in 3D for sample No. (1)	27
(4.2)	Show scan in 3D for sample No. (2)	28
(4.3)	Show scan in 3D for sample No. (3)	28
(4.4)	Show scan in 3D for sample No. (4)	29
(4.5)	Show scan in 3D for sample No. (5)	29
(4.6)	Show the ultra sonic result for sample No. (1)	31
(4.7)	Show ultra sonic result for sample No. (2)	31
(4.8)	Show ultra sonic result for sample No. (3)	32
(4.9)	Show ultra sonic result of sample No. (4)	32
(4.10)	Show ultra sonic result of sample No. (5)	33
(4.11)	Ultra-sonic results	36
(4.12)	Inspection radiographic results	37

List of tables

Table	Subject	Page
(2.1)	Show fiber properties which ASOTA used in 2001.	10
(2.2)	Chemical analysis of mesquite wood powder	11
(3.1)	API classes of Portland cement	13
(3.2)	Typical physical properties of API cement	14
(3.3)	The percentage of mesquite wood powder added to Samples.	19
(4.1)	Show the results of compressive strength for samples	26
(4.2)	Show the results of easy scanning	30
(4.3)	Show the results of ultrasonic	33
(4.4)	Show the results of inspection radiographic	34
(4.5)	percentage of mesquite wood powder and micro crack length	36
(4.6)	percentage of mesquite wood powder and number of micro-cracks	37