Medbiotech Journal

MBTJ, 4(3): 109-113, 2020

Research Paper

Application of Biotechnology in Fossil Fuel Production

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Received: 06 July 2020 Accepted: 18 August 2020 Published: 01 September 2020

Abstract

Using the new science of modern biotechnology applications in addition to the required material parameters are needed to improve energy efficiency and energy conversation increases. In order to study the effect of the microorganisms of excavation fluids, some experiments were designed for the basic drilling mud, then with some standard attributes, the basic drilling mud was prepared that contains the four mentioned bacteria. These bacteria were added to the fluid separately and were put in 37 centigrade. After a day some tests such as mud filtrate, pH, gel strength and mud cake thickness will be done. The slightly parameters in this experiment is only on the type of the microbe and other variables are fixed. Increase in mud cake, decrease in filtrate in some fluids, the variety of gel strength and the production of the best fluid for the unstable and swell formation against the seepage of the filtration of water base mud are the upshots of this experiment. Taking advantage of these tests can help to conversation energy issues and specifically engineered for modern and fossil fuel extraction will.

Keywords: Drilling Fluid; Mud Filtrate; Mud Cake; Biotechnology; Gel Strength

How to cite the article:
H. Tafreshi, S. Aghaei, Application of Biotechnology in Fossil Fuel Production, Medbiotech J. 2020; 4(3): 109-113, DOI: 10.22034/mbt.2020.115542.

1. Introduction

Drilling fluid term that refers to those fluids used in drilling and in the following:

- ❖ Formation pressure
- ❖ Well drilling cut out
- ❖ establish and protect the well walls
- ❖ Protection zones penetrated
- ❖ cool, clean, clear and polish tubes drilling bit Vrshth
- ❖ keep the particles suspended and cut off the flow of drilling mud ...

Drilling at least one of the above Cases are fundamental to drilling fluid should be selected according to the original conditions [1-3].

Of water or oil-based drilling mud is formed, but according to the necessity of colloidal particles such as clay and other circumstances may Some of the chemical composition of the flower is to be added. Biotechnology first term in 1919 by Karl Ereky to the application of life sciences and technologies in the building was used for human. In general, any action on the creation of intelligent human, and improve the supply of various products using organic, particularly through their manipulation at the molecular level in this important area, the clearest and present century.

Now the new achievements of science and engineering, drilling, industrial biotechnology, the use of microorganisms to enhance the efficiency of drilling fluids are. Loghmani colleagues [3-5]. The effect of adding two different bacteria on the increase in oil, in a laboratory model contains examples of porous reservoir rock and One of Iran's oil reserves were examined. In this paper, considering the results published by some colleagues as default Loghmani, The Times is trying to determine the impact of drilling mud should be assessed on four different bacteria [6].

Shale is a geological term for the clay layers have a laminated structure and Thus fully or partly in the

layering of the gap are used. For example, clay is pressed or plastic and has a cavity structure; Marley is brittle or friable; shale usually shows a layered mode. However, in the drilling industry, shale clay as a heterogeneous material is considered. Matrix with very low permeability of shale is common property that has some clay minerals. Instability in shale in many cases insufficient hydrostatic support comes from wells on the wall, the cavity pressure gradient near the wall of the well results will be poor [7-8].

Increase the amount of water in the zone near the well hole will lead to low strength shale. The water in the shale is a control mechanism, but the most effective of the hydraulic pressure difference (DP) and the cavity between Fsharchah shale and chemical potential difference (Du) between the drilling fluid (filtered) pressure cavity is shale. Assuming that the presence of shale in the drilling fluid density is correct, so that shear failure (very low mud weight) or tensile failure (high mud weight) does not occur. Van oort was determine three mechanisms that Instability in neighboring wells can be located with respect to the time of drilling fluid occurs. The high well hole pressure near the wall due to the influx of the well's pressure leads to an effective reduction in support is the goal. The high inflation pressures (for example, lead to inappropriate choice of cation exchange cationic clay is undesirable in the sides) to reduce the effective stress Chemical changes and the weakening of the cement bonds [9].

1.1. Oil-based mud (OBM)

The basic goals of the stability of oil shale is well known. Osmotic transfer of water from the shale to a semi-permeable membrane through an emulsifier OBM and OBM (the drive mechanism) is done. Data measured by Moody's colleagues on the basis of two propulsion (Du, DP) and the hydraulic and osmotic transport mechanisms for expression, because the base fluid on the stability of oil shale has been used and are effective: The input threshold capillary pressures between the OBM and low permeable shale [10-12].

The entrance to the capillary pressure in a dense network of radial stress on the walls of the wells are interpreted to increase the stability of the well. Laboratory experiments confirm the idea that the OBM emulsifier surrounding individual droplets of water, features a semi-permeable membrane are prepared. This allows the osmotic transfer of water from the shale or shale occurs (Table 1). Active phase, base oils, flower water (molar free energy) has been manipulated to ensure the transfer of water from shale and can also lead to increased resistance shale wells in the area near the hole.

Table 1. The base fluid filtrates.

Volume(ml)	Time (s)	Volume (ml)	Time (s)
10.2	270	2	30
11.0	300	3.4	60
11.8	330	3.5(4.5)	90
12.4	360	5.4	120
13.1	390	6.6	150
13.9	420	7.4	180
14.5	450	8.5	210
15.1	480	9.3	240

1.2. Water-based mud (WBM)

Initial research focused on chemicals in order to sustain the presence of shale in the WBM is the flower of salt, lime and potassium were introduced. Recently, application of Darcy's law for the problem of clay hydration, researchers find ways to manipulate the viscosity of mud filters (for example, use of gum Gzantan, PHPA), the pressure difference DP (bottom fluid mud density) and permeability shale (factors such as obstruction of asphaltene and Gylsonyt) is forced [13-15].

Subsequent studies to determine the shale hydration-driven mechanisms that lead to the identification of the hydraulic pressure to the shale / OBM is. Dense network of radial stress with time can be torn apart to balance the pressure between the wells and shale occur ΔP = 0. At this point, effective protection against the mud and shale is shale will be crushed. Depending on various factors that will occur in varying degrees, the low permeability shale and it is a DP.

Table 2. Resistance to different drilling fluids.

Based fluid containing	YP	PV(cp)	FGS	IGS
E. coli	11	5	10	14
Pseudomonas Aeroginosa	2	2	0.5	1
Bacillus cereus	5	3	4	21
Pruteus mirabilis	5	3	1	1
Base	2	5	3	4

mineralogy clay materials such as shale indefinitely throughout the range is changed, a WBM seemed almost impossible, the ability to eliminate inflationary pressures and changes in the concentration of cement have. For example, potassium K + ions can be useful in deterring swelling clays Monte Murilonite But the effect of low or no effect on the illite and kaolinite in inflationary pressures may increase.

Researchers have identified a matrix rich in clay with a permeability lower shale intact in the vicinity of WBM can be used as a membrane ideally

suited to act as mobility solutions through a hole with the type of solution changes and the primary function of the radius of the solution is hydrated.

2. Experimental

The first step was to build five barrels of water-based drilling fluid. The fluid within the chamber, each containing 1ml of whey, and 1gr soybean meal powder was transferred to, and And bacteria from the culture plate into the chamber (Table 2).

The four-chamber in which bacteria, E.Coli , Pseudomonas Aeroginosa, Bacillus cereus, Pruteus mirabilis, have been growing, within a prepared environment with a temperature of 37° C, ambient pressure , dark And placed for one day.

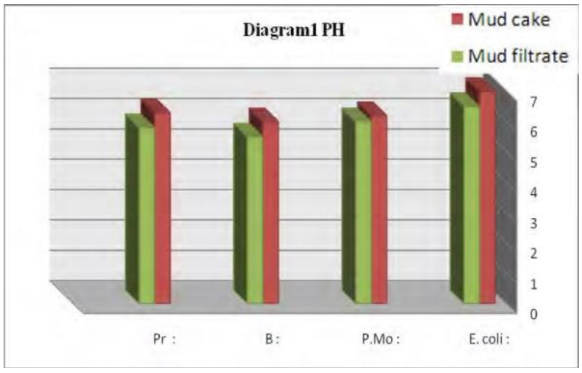

Figure 1. Comparison the effect of pH on Mud cake and Mud Filtrate.

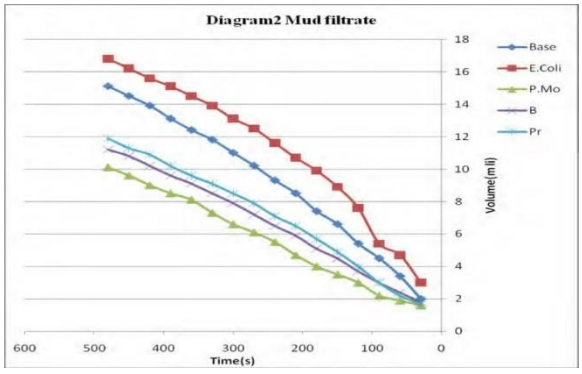

Figure 2. The changes of base, E-coli, P. Mo, B and Pr during time for Mud filtrate

3.1. Viscosity Assay Test

In this test can be find that initial gel strength of the fluid containing Bacillus Cereus is much higher than the ground state. E. Coli can also be contained in the fluid can see the difference. In fluids containing Pseudomonas Aeroginosa, Pruteus mirabilis the initial gel strenght is less than the base case.

The final gel strength of the E.Coli and Bacillus Cereus contained is higher than the ground state and Pseudomonas Aeroginosa and Pruteus mirabilis are smaller than the base state, but the IGS and FGS of the fluid containing Bacillus Cereus is very high that it can be refers to the test error.

As is shown in the table, the plastic viscosity of the fluid containing E. Coli same as the basic mode and other fluids PV are lower than the ground state.

The Yield Point, except the fluid containing Pruteus mirabilis that have the same amount as the ground state, other Fluids Yield Point is far more than their base state.

3. Results and Discussion

Can be concluded that the fluid containing the E. Coli and Bacillus Cereus are appropriate in terms of gel strength and can be used to enhance the gel state of the drilling fluid and transport the cuttings away from the bottom of well to the surface.

The test passes water filtrate fluid within the ressure, observe that the drilling fluid containing E. Coli with more water filtrate than other goals are. Three drilling fluid tested also showed far less water filtrate than the base state in given period lowest water filtrate compared to other liquids, showed itself.

Goals related to coating thickness in each of the test drilling fluid can be received the thickness of the coating fluid from the four basic goals are more and this can be due to an interconnected network of cell mass as well as Selectively blocked. The mud cake thickness of a fluid containing Pseudomonas Aeroginosa is lowest which Given the low amount of fluid water filtrate, it as an ideal fluid for drilling the various formation, specially the limestone and shale formations. Pruteus mirabilis contained fluid with its high coating, can be a good choice to strengthen the walls of wells with low resistance (Table 3 and 4).

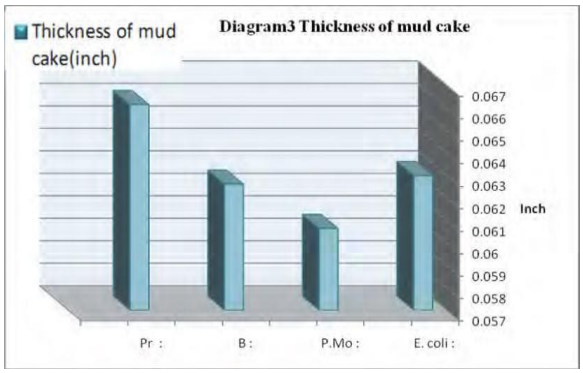

Figure 3. Thickness of mud cake

According to the results mentioned above we can see that, performing these tests and consider the circumstances unique to each well, the desired parameters in the drilling fluid, particularly drilling and development has improved, besides saving time for planning and drilling wells for oil and gas, energy conversation category is the priority (Figure 1).

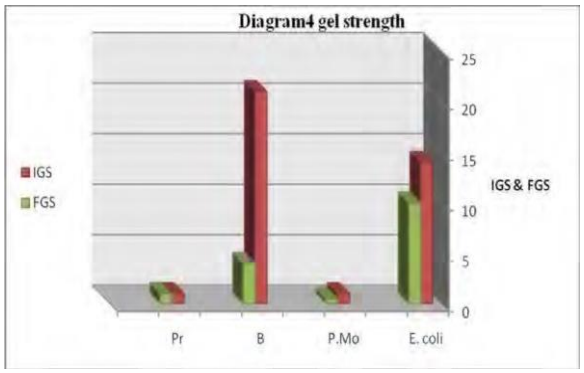

Figure 4. Gel strength

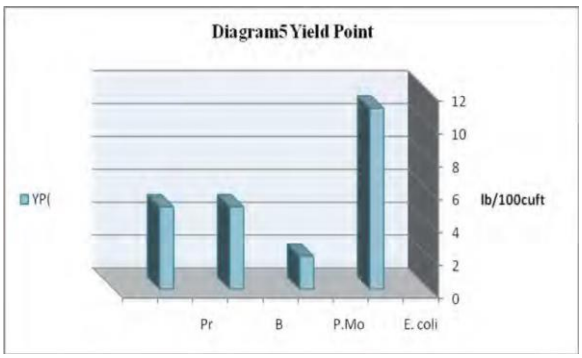

Figure 5. Yield Point

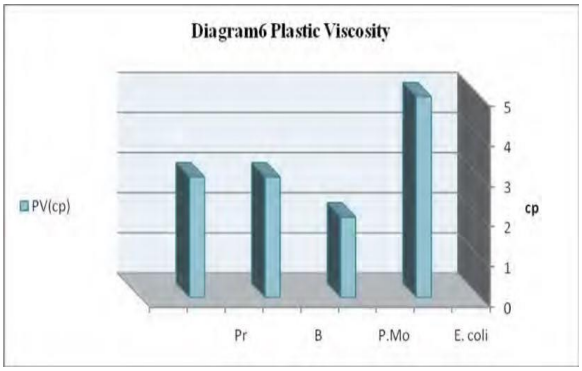

Figure 6. Plastic Viscosity

Therefore it is suggested that the oil industry and sub-subsidiaries and industrial researchers to use with their projects and papers, Drilling oil and gas wells in the use of new technologies, including bio- and nano-fluid drilling fluid into the well with the formation In the category of optimal extraction methods and operational conversation of the wells that are energy efficient to take steps To modify consumption patterns, drilling wells in a shorter time and with better performance must be done Figures 2-4).

Table 3. Thickness & pH drilling fluids

Based fluid containing E. coli	pH of fluid filtrate	pH of Mud cake	Thickness of mud cake
Pseudomonas Aeroginosa	6.5	7	0.06299
Bacillus cereus	6	6.2	0.06063
Pruteus mirabilis	5.5	6	0.06260

Table 4. The amount of filtrate and drilling fluids

Volume (ml) for Pruteus mirabilis	Volume(ml) for Bacillus cereus	Volume(ml)for Pseudomonas Aeroginosa	Volume (ml) for E. coli	Time (s)
1.7	1.8	1.6	3.00	30
2.2	2.4	1.9	4.7	60
3.00	3.00	2.2	5.4	90
4.00	3.7	3.00	7.6	120
4.9	4.5	3.5	8.9	150
5.7	5.1	4.00	9.9	180
6.5	5.9	4.7	10.7	210
7.1	6.5	5.5	11.6	240
7.9	7.2	6.1	12.5	270
8.5	7.9	6.6	13.1	300
9.1	8.5	7.3	13.9	330
9.6	9.1	8.1	14.5	360
10.2	9.6	8.5	15.1	390
10.9	10.2	9.00	15.6	420
11.3	10.8	9.6	16.2	450
11.9	11.2	10.1	16.8	480

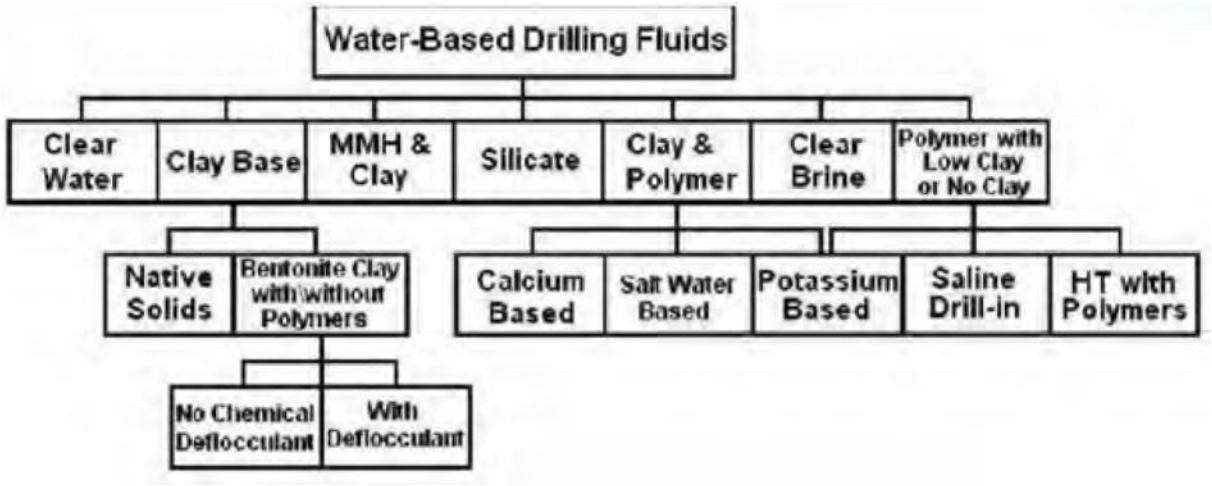

Figure 7. Classification of Drilling Fluid

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