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Review Article

Investigating the Effect of Nano Technology on Increasing Utilization in Oil Tanks and Wells in Upstream Industries

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ABSTRACT

The oil industry needs solid and reliable materials in almost all processes. By making nano-scale materials, lighter, more robust, and more robust equipment than today's products can be produced. Nanotechnology in the field of oil industry and its related industries, in addition to reducing the environmental hazards of this sector and the possibility of saving from harvesting of underground reserves, will provide the basis for the growth of the country's major industries. Oil and gas industry in Iran is a long time and enjoyed. From these enormous resources, it has created a special place for the country. The effort to achieve technology and improve the status of these industries is something that should be given special attention. For this reason, the oil, gas and petrochemical industries have not gone away far beyond the penetration of nanotechnology, and nanotechnology has also entered this area.

Keywords: Strong, Products, Nano, Oil, Range

Introduction

Nanotechnology has broken the boundaries of various sciences with its own nature, and has provided ground for using the results, facilities and tools of all sciences and disciplines to improve the quality of life. Operation of wells includes all activities that lead To produce, maintain and increase it. In this case, it is possible to carry out experiments required for wells and operations for improvement (acidity, lattice, blocking, monitoring of pressure and discharge). Nanotechnology can play a vital role in any of these sectors. The key to this role is the change in the structure of tools and materials used in this operation. Certainly, the use of nanotechnology could facilitate and expedite operations, and ultimately lead to an increase in production from wells.

The role of nanotechnology in exploiting oil wells

Monitoring the status of the wells

One of the important operations in the field of data collection is the recording of accurate information about the condition of the cells, such as pressure, temperature and discharge at the head or at the bottom of the well. Ensuring the correct functioning of the equipment is important. Researchers at the Virginia University's Photonic Laboratory are developing specific types of reliable and inexpensive sensors from optical fibers to measure pressure, temperature, oil flow and acoustic waveforms in the cell. They are. These sensors are very much considered due to small size advantages, immunity to electromagnetic interference, efficiency in high pressure and high temperatures, and difficult environments. Most importantly, it is possible to replace and replace these sensors without interfering in the process of producing oil at a reasonable cost. Nowadays replacement and replacement of old sensors in oil chains has huge costs. New sensors in terms of production are very affordable and offer more accurate measurements. It is expected that the technology of these sensors will improve oil production by providing accurate and reliable measurements and reducing the risks associated with oil exploration and drilling.

The sensors are also of particular interest due to their ability to use in special cases such as offshore and offshore oil extraction, where it is very difficult to use old sensors in such situations.

Lattice work

The major part is the completion of a well, latching the production layer if needed. This action, namely, the establishment of the relationship between the production layer and the inside of the well, is carried out by piercing the sealing wall. Nowadays, they lattice in two layers: one by special balls, which are thrown by a specific method from the well into its metal wall (at the desired depth), and the other by a metal meteorite that uses gunpowder The operating procedure is almost the same and only the type of bullets is different. Nowadays, metal meteorite operations are commonly used, in which two different metal and explosive materials are used to generate enough power. It depends on the type of explosives, the shape of the bullet, the type of stone, etc. With a grid, a pipe, a casing or a cement behind it, as well as a part of the layer Then they get into the hole, then oil or gas flows through the well into the well. Recent developments in surface engineering using smart coatings and coating technologies, friction and abrasions are available on the market. Surface is better controlled by the absorption of sulfur and phosphorus, which reduces viscosity and enhances viscosity in fluid. In recent years, a variety of nanostructure coatings have been made of ceramic and metal phases. The coatings have a multi-functional capability due to their nano structure and uniformity throughout the coating. In addition to high hardness, low friction coefficient, these coatings have high electrical or thermal conductivity properties.

Cement work

The precise cementitious work of cement pipes is of particular importance in drilling operations, in other words, if the fracture quality is low, there will be problems at the time of production from the well. Cement pipes are bonded to the wall of the well with cement. In this process, first the interconnecting pipes are connected to each other and driven to the bottom of the well. Then the cement is pumped from the bottom of the well to the back of the tubes (the space between the tubes and the wells of the well) and comes up to the surface of the earth. The type of cistern used for the operation depends on the type of operation and the condition of the wells and layers. Cement should have properties such as its ability to pumice, proper viscosity and ultimate hardness. The above properties can be obtained using nano-fats. The nanoparticles are added to the cement due to the properties of the quantum mica and the mass of the material, resulting in its proper quality. One of the most obvious properties of these particles is that, after the addition, the whole mixture is uniform and consequently the uniformity of the properties of the cement.

The Interaction between oil extraction using nanotechnology

The process of exploration of oil fields is declining and many oil reservoirs are at the end of their production period. The importance of improving and improving the removal methods is that in most of the world's oil reservoirs, about two-thirds of the oil's reservoir remains intact and can not be removed using conventional methods. The presence of nanotechnology in this sector can lead to increased efficiency Energy tanks help.

Heat insulation and anti-corrosion of nano-structures with liquid coating

The special feature of this product is its fluidity, which allows it to be used on metal and non-metallic surfaces by pistol, brush and painting rolls. Also, in nanoscale particles, these coatings cause the most penetration in the surface cavities, which are covered by the coating, and because the particle size of these coatings is in milliquarrel, both from space and materials to The correct amount was used. In addition, the density of these thin layers is so low that the porosity is very low and the factors that cause corrosion also can not penetrate these layers. In addition, the adhesion of this type of coating to the target material is very good and the coating strength is very high, and because of the uniform distribution of the coating, the thin layer dispersion eliminates the potential difference and eliminates the driving force to start corrosion.

Reducing Nano Contamination by Oil Production

Pollution by chemicals or pollutants is a very difficult topic in oil and gas production. The results of research from scientists suggest that nanotechnology can help reduce pollution in a satisfactory way. At present, filters and particles with a nanoscale structure are being developed that can separate organic compounds from vapor. Despite the fact that they are about a few nanometers in size, they have a wide exterior surface and are able to control the type of fluid that passes through them. Also, nanostructured catalysts are used to facilitate the separation of hydrogen sulfide, water, carbon monoxide, and carbon dioxide from natural gas in the oil industry. At present, studies have been carried out on samples of clay in nano dimensions and in combination with polymers that can absorb hydrocarbons. Therefore, it is possible to separate oil residues from drilling mud.

Improve oil extraction using nanosensors

Due to the high temperature and pressure in extreme environments underground, Sensors old electrical and electronic and other industries measured reliably are not and therefore mining

companies shows the oil in the preparation of the necessary information and sensitive to extract the full and effective oil from the tanks of nano-sensors use . Nanosensors are highly cost effective in terms of production and provide more accurate measurements. It is expected that the technology of these nanosensors will improve oil production by providing accurate and reliable measurements and reducing the risks associated with oil exploration and drilling. Also, these nanosensors are of particular interest due to some special applications such as marine and horizontal oil extraction, where the use of old sensors is difficult in such situations.

More qualitative seismicity using nano sensors

One of the applications of nanotechnology in the oil and gas industry is the use of it in shading printing. Seismic operations are performed by special devices by blasting in different locations on the ground, and then recording the intensity and amplitude of the seismic created. From the seismic data it can be obtained: the general structure of the layers of the earth, the reservoir range, the type of fluid (gas, water or oil, etc.). Receiving information in seismic operations is done by specific sensors. It seems that by making nanosensors the seismic recording can be done more precisely because it is possible to enter these sensors in different layers of the earth and record seismic in various situations. Nanotechnology can, in addition to the development of the nanostructures of geophones (small seismographs), lead to faster performance and more accurate voice recording on the ground. The use of nanotechnology in tools for exploration of oil and gas can help to obtain more accurate information, and especially the acquisition of information from vast depths and, consequently, more comprehensive knowledge of reservoirs.

High precision mapping using nano sensors

Nanosensors are used precisely for analyzing beams, due to their high level of use. In addition to these functions, these nanosensors will have the task of determining the layers' appearance and ensuring fluid properties. These sensors are highly regarded in the oil industry due to advantages such as small size, immunity to electromagnetic interference, high pressure and high temperature performance, and tough environments. As we said, nanosensors are very cost effective in terms of production.

Production in drilling using nano

By reducing the resources available to the oil and gas exploration and production industry due to increased operational depth, the risks and problems associated with sub-surface geology with

increasing depth, horizontal motion to achieve maximum production, the complexity of drilling operations and the shape of the wellhead or the number of branches Output from the main mouth to achieve maximum contact with the tank has faced challenges. In all processes of oil and gas drilling, solid and reliable materials are needed. By making nanoscale materials, lighter, more durable and more robust equipment than current products could be produced. Two major uses of nanotechnology in drilling operations are the construction of fluids and drilling tools that will be referred to below.

Ultra-resistant drilling equipment using nano

The greatest tension during drilling operations enters drilling drills. Drill bits are part of the digging field that are constantly eroding and after digging a marked area, they lose their efficiency and should be replaced. New materials that make the drill more resistant to corrosion and erosion are very useful in this section. Therefore, nanostructures and carbon nanotubes can be used to produce durable and durable drill bits using nanocomposites. Also, using synthetic nanodiamonds can greatly increase the drilling efficiency.

Improve drilling efficiency using nano

Drilling mud plays a major role in accelerating or delaying drilling operations. Drilling mud is a fluid pumped from the drill pipe to the bottom, comes from drill holes, and then carries drilling logs from the circular space between the walls of the well and drill pipes. This fluid has many functions in drilling operations, such as drilling crushers, cool drill bits, preventing wall wells, wall pressure control, and hydraulic pump transfer to drill bits without which drilling operations are possible. Not acceptable. Properties such as hydraulic power transferability and compressibility are among the most important factors that can be achieved using nanocomposites, carbon nanotubes, and some hard-wired ceramic nanopowders with a specific gravity (such as carbide carbide nanopowders). The drilling mud should have properties such as the viscosity density of the drill bit to the top, as well as the ability to transfer hydraulic power to the pumps. Acquire the properties required in drilling mud by adding certain chemicals, such as polymers, weighers and others. . . It is possible . It is possible to obtain properties such as the proper density using nano-fats. Suitable viscosity is also achieved by adding lubricating oil-based nano-oils. Properties such as hydraulic power transferability and compressibility are

among the most important factors that can be achieved using nanocomposites, carbon nanotubes, and some hard-wired ceramic nanopowders with a specific gravity (such as carbide carbide nanopowders). The thixotropic properties of drilling mud can also be achieved with nano additives. If drilling operations were likely to be cut off, the flowers should be in gelatinous form, preventing the digging of the drill, and prevent the digging tool from getting into the well. Also, gelatinous flowers should be able to flush with gelatinous state with minimal stress and again to restore the thixotropic properties of the flower. In this section, the use of nanomaterials has a significant effect on improving these properties.

Interaction of Nanoparticles with Oil Extraction

Polymer-coated nanoparticles can be used to identify crude oil in mature oilfields, according to scientists in the United States and China. Given that it is estimated that only about 60 percent of the crude oil is harvested in mature oilfields, it seems likely that the remainder could be identified as a large untapped resource. Now, James Tour and his colleagues at Rice University and the University of Nanjing, China, have designed nanoparticles to identify crude oil hydrocarbons amongst the rocks in these oilfields. These nanoparticles move among the rocks and, when they find crude oil, they leave their cargo. The nanoparticles of these researchers include carbon oxide nuclei, coated with polyvinyl alcohol shells. These nanoparticles can convey the hydrographic (or waterproof) composition called the nanoscale, throughout these rocks. Tour says: It's really exciting to think that we can build nano-millers that can migrate across crude oil fields. These nanoparticles, when they contact with crude-containing rocks, release their cargo and can be seen by recycling them.

Expansion of heavy fuel tanks using nano

Heavy oil is part of a significant oil resource, which remains largely intact due to extraction problems due to high viscosity. At present, extraction of heavy oil reservoirs is carried out using thermal recovery methods, CHOPS, injection of solvent and injection of gaseous mixtures. In this paper, the advantages of three separate processes including thermal methods, solvent injection and intermixing gas injection are combined and a new process is proposed to reduce the viscosity of heavy oil. In this study, metal nanoparticles were used to increase the thermal conductivity of supercritical carbon dioxide or viscous drainage fluid (VRI) to reduce the

viscosity of heavy oil. A super-critical superoxide soluble surfactant has also been added to the mixture to enhance this viscosity reduction. Therefore, the thermal properties of metallic nanoparticles, the chemical properties and solubility of surfactants, and the supercritical carbon dioxide and viscous doping fluid mixing properties, all contribute to reducing the viscosity of heavy oil and facilitate the extraction of this type of oil. Heavy or super-heavy oil refers to crude oil that does not flow easily. The reason for using the word "heavy" for this type of oil is its high density compared with light petroleum. Typically, heavy oil with an API degree of less than 20 (or, in other words, a relative density of more than 933). Production, transfer and refining of heavy oil is more difficult than light oil. The world's largest heavy oil reservoir is located in northern Venezuela. But in general, more than a dozen countries have heavy oil tanks. The high viscosity and relative density, as well as the heavier molecular composition of this type of crude oil, are the most important physical properties that make up a difference between heavy oil and light. Venezuela's ultra-heavy oil has a viscosity of more than 10,000 centimeters and an API degree of 10. Usually, for the transfer of this type of crude at specified intervals, pipelines are used from diluents that facilitate fluid flow.

Production methods from heavy and super heavy fuel tanks include

a . Cold heavy oil production with sand

b . steam assisted gravity drainage

c . cyclic steam stimulation

d . vapor extraction

e . Toe-to-Heel Air Injection (THAI)

The classification of oil reservoirs into light and heavy oil reservoirs is based on the API grade API. Although there is no uniform international classification for this purpose, typically, oils with API grades between 12 and 20 can be classified as heavy oil and petroleum Classes with an API grade of between 8 and 12 were classified as super heavy. There are huge amounts of heavy and heavy oil in parts of the world, especially in the countries of Canada, the United States, Venezuela, Iran, Mexico, Russia and some of the countries that produce crude oil in the Middle

East. In general, the total amount of crude oil and natural gas resources in the world is estimated to be around 6 trillion barrels of oil per capita, which is three times the ordinary oil reserves of the world. Also, according to studies, the total amount of Iran's heavy oil reserves is estimated at 85 billion barrels. Despite the large volume of heavy and natural gas reserves, production from these energy sources has not simply taken away from conventional crude oil reserves and is using conventional technologies. They are not easy to use. The presence of high viscosity and high percentage of asphaltene and resin compounds in this hydrocarbon causes problems in the extraction, transfer and processing of heavy oil. Initial harvest in a small number of heavy oil and bitumen tanks, which have better conditions, reaches up to 6% of the oil inland. Therefore, the use of recycling methods seems to be necessary from the very beginning of harvesting of these types of reservoirs.

The ever-increasing demand for oil and its products, and the reduction of natural gas from light petroleum storage tanks, and, on the other hand, rising oil prices in recent years has led to increasing attention to production methods from heavy and heavy oil tanks. As the estimates show, Canada's heavy oil production in the near future will exceed 1. 2 million barrels per day. In Venezuela, according to planning, oil companies plan to reach 600 bpd. The Chinese government is also planning to increase its crude oil production to 150,000 barrels a day in the near future. This is despite the fact that in Iran due to the considerable reserves of heavy oil, due to lack of relevant technology transfer, production of heavy oil fields does not take place. Because of high viscosity, heavy and heavy oil tanks are not remarkable for initial recovery. Therefore, for efficient recovery of such reservoirs, it is necessary to reduce the viscosity of the oil in situ by using heat treatment, so that more than 80 percent of the production of heavy oil At the stage of extraction, the harvest is carried out using thermal methods. In general, heavy and heavy oil tanks require measures to reduce the viscosity of oil and bring energy into the reservoir. When super-hot steam is injected into the reservoir, the viscosity of the oil decreases, reservoir pressure increases through displacement and partial distillation of the oil. The steam can be continuously injected into a reservoir in the form of a flood or in a continuous manner and in a multi-cycle. In the discontinuous mode, it is possible to inject the steam from a well (in the role of the injection well) into the reservoir and then to extract the oil from the same well (this time in the role of the well). Gas injection, either in the form of an intermixing (which gas

Injection and oil inside the reservoir are intermixed with each other and form a fluid fluid), as well as non-injectable (which piston gas injected into the reservoir leads to production wells), are methods of recovery that are Widely used after oil extraction methods.

Conclusion

Considering the issues mentioned in the article and the widespread use of nanoscale in the upstream industries, especially in increasing oil production, and its excellent impact on increasing the take-up and utilization of this technology for the upstream industry, recognizing this technology and how it is used for this large industry It is very important and with the advent of science, the scope of using this valuable technology is much wider.

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