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Research Status of Oilfield associated gas

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Abstract*:-* oilfield associated gas, also known as oilfield gas, is an accompanying oil nature gas that escaped from the well. The main component are methane, ethane and some low molecular. amounts of propane, butane, pentane are contained in oilfield gas. The oilfield associated gas can be used for the preparation of liquefied petroleum gas, and used as fuel or chemical raw materials. It is flammable, explosive and harmful gas. The advanced recovery unit mainly include membrane separation technology and vortex tube technology. Associated gas can be used for power generation, the production of liquefied gas, acetylene, ammonia. It is able to utilize the effective energy.

Keywords*:-* oilfield associated gas; energy-saving; emission reduction.

I. INTRODUCTION

The energy shortage is a bottleneck in the development of the world, and it's also a major strategic issue of global economic and social development. An effective way to solve this problem is to cut costs, it is an important way to cut expenditure in recycling and utilizing the oilfield associated gas. Reasonable utilization of oilfield associated gas resources is urgent matter, and it is also inevitable trend in lasting development of energy.

II. OVERVIEW OF OILFIELD ASSOCIATED GAS

The oilfield associated gas is also known as oilfield gas, commonly known as gas, it is natural gas that escaped from the well with oil. The main component is a low molecular weight alkenes such as methane, ethane; it also contains significant amounts of propane, butane, pentane and so on; it can be used for preparation of liquefied petroleum gas and a fuel or chemical raw materials; It is toxic and harmful, also it is flammable and explosive. Because of China's environmental protection requirements are relatively low, a lot of oilfield associated gas is released and combusted. It not only caused a waste of energy, but also discharged greenhouse gases to pollute environment. Due to the gradual scarcity of global energy resources and the daily raising of requirements for environment, the recovering of Oilfield associated gas has attracted more and more attentions and the research will becoming a focus.

It is estimated that, with improve of Low-carbon green economy, the demand for natural gas will be growing at about 2.6% a year in next twenty years. This figure is vastly exceed the demand for oil and coal. According to the U.S. National Oceanic And Atmospheric Administration statistics. The world has burned 1680 hundred million cubic meters associated gas in 2006. The biggest associated gas burning country is Russia. In 2006 alone, Russia has burned 50.07 billion cubic meters of associated gas. It is estimated that per 1,000 cubic meters of associated gas is equivalent to 1.07 tons of oil. On this basis, Russia has equivalent to wasted more than 5,000 tons of oil in2006. This not only caused a huge waste of resources, but also aggravated the pollution of environment.

III. ADVANCED RECYCLE PROCESS OF OILFIELD ASSOCIATED GAS

A. The vortex tube technology

In1930s, the United States had studied in the vortex tube technology, at that time this technology was not used for the recovery of associated gas, till 80s，it applied to the associated gas recovery [4]. Vortex tube technology has the following advantages: light weight, easy processing, small volume, compact structure, no moving parts, needn't to enchase absorb (attached) agent, low cost, doesn't need regular maintenance, safety and reliability, convenient to adjust, can quickly start or stop, high recovery rate of associated gas and so on. There is no other method can replace Vortex tube technology's use value in remote oil associated gas recovery.

B. Membrane separation technology

Membrane separation phenomenon has been recognized for long time, however, was used in industrial areas in the mid - 20th century [5]. Due to the development of a variety of membrane separation technology，membrane separation technology has been applied to gas separation, purification, purification, and processing. The United States has been already used membrane separation apparatus applications at the wellhead，for

removal hydrogen sulfide, carbon dioxide , water in the gas，to make gas achieve the standards for the transport. According to the membrane separation technique，to preheat after pressurized gas-liquid separator the oilfield associated gas ， and then through the membrane separator the product gas can be obtained[6].

IV. APPLICATION OF OILFIELD ASSOCIATED GAS

Due to nearly 77% of the oilfield associated gas components are methane, and are similar to natural gas components, they are a wide range of uses in the industry [7].

A. Power Generation

Compared with conventional power generation, using natural gas or the oilfield associated gas to generate electricity has the following advantages: ①the environmental protection, higher effluent standard; ②the economy, comprehensive utilization of gas power generation, the cost is far below that of using the diesel oil and heavy oil to generate electricity, and below the electric supply price, if we make use of the discharge heat energy, it can further reduce the cost; ③the energy conservation, higher generating efficiency[8].

B. Producing light hydrocarbon products

After the predissociation of oilfield associated gas, enter into the compressor to supercharge, and then improve gas pressure 2.5 MPa, enter into the separator to separate, and separate parts of moisture and lighter hydrocarbon from the natural gas. Drying the separated natural gas through the drying tower, and puring water of the natural gas, and then cooling it through the precooler. Swelling the cooled gas, when the gas temperature drops to minus 30 °C, the light dydrocarbon will be separated out, then entering into the separator to separate the gas-liquid, after making mixed hydrocarbon separation, after separating the mixed hydrocarbon, entering into the ethane reboiler, making an deethanization, then taking the ethane off from the light hydrocarbon, and then the light hydrocarbon enters into the debutanizer to separate, and finally separate the oil light hydrocarbon and liquefied gas out[9].

C. Production of acetylene

Acetylene is an important raw material in the chemical production, such as pesticides, film stock, synthetic fiber, artificial wool; solar cells are made of acetylene as raw material. The content of methane in oilfield associated gas is higher, the methane content is about 77%, and the methane is the raw material of producing acetylene. Using methane through the arc method, thermal cracking method, plasma or methane partial oxidation of acetylene, than using coal by calcium carbide method has advantages of acetylene production, such as low production cost, less energy consumption, higher labor productivity [10].

D. Synthesis ammonia

China is the world ammonia production superpower, at present, mainly do a good job in a large enterprise energy-saving technological transformation, and at the same time, adjust the structure of products and the overall layout, change the phenomenon of nitrogen more, phosphorus less and potassium missing, and the production of high concentrations of fertilizer and compound fertilizer is the focus in the future. Scale of ammonia production except a single series of large-scale development, Skid-mounted small production device is especially suitable for early development of oil and gas fields or single gas well of low yield. Although China is the world ammonia production superpower, the production capacity of natural gas as raw materials accounted for only about 23%, far below the world average, therefore, the use of oilfield associated gas synthetic ammonia have much room for development.

E. Production of liquefied gas

With the improvement of people's living standards, our city gas demand for natural gas is increasing. According to the survey, at the end of 2003, the city use of natural gas has been more than 100, and the city away from the gas source is regard liquefied natural gas as the source, through this way, greatly reduce the cost of the installation of long-distance pipeline[11]. Because the factory of LNG is less in China, the capacity of annual production is also lower, unable to meet the needs of the fast development of city gas. If the oil field associated gas processing into high-value-added liquefied natural gas, as the source of city gas, there will be a better market prospects.

F. Production of liquefied gas

Currently, the market for natural gas vehicles use natural gas as a fuel is divided into: compressed natural gas (CNG) and liquefied natural gas (LNG) [12]. Compressed natural gas (CNG) is a colorless transparent, high-calorie, tasteless, and is lighter than air, the main component is methane, CNG component is simple, relatively easy to complete combustion and less carbon content of fuels, antiknock, will not cause dilution for

the lubricant and extend the life of the engine[13]. Liquefied natural gas under atmospheric pressure, the temperature is -162 degrees Celsius in a liquid natural gas, is typically stored in vehicle insulation cylinder. Liquefied natural gas (LNG), a high flash point and safety performance, long-distance transport and storage [14] . Oilfield associated gas is similar to the composition of natural gas, oilfield associated gas after treatment process made the "compression associated gas" or" liquefied associated gas", so as to achieve the purpose of providing energy for natural gas vehicles or LNG vehicles.

V. CONCLUSIONS

Oilfield associated gas recovery get more and more attention. Oilfield associated gas recovery should be paid more attention and effort in China. One hand, the recovery unit and process need to be researched and developed. This can improve the deficiency of the recovery unit and process. To realize that the recovery of oilfield associated gas is complete. The other hand, to pay attention to cultivate the market of associated gas recovery. To extend application prospect of oilfield associated gas. With the development of science and technology and the constant effort of scientific research personnel, the oilfield associated gas recovery will obtain the larger breakthrough in China.

REFERENCES

[1]. Wang Ping, Chang Yu wen, Tang Wei. Current situation and changing characteristics of oil reserves in China[J]. Special Oil and Gas Reservoirs, 2011, 18(1): 12-15.

[2]. Xu Dong jin, Ma Li, Cheng Jun. Current State and Analysis of Oilfield Associated Gas Recovery Unit[J]. Oil Forum, 2010, 4: 29-33.

[3]. Tan Yue. Process and Transportation of Offshore Oil Field Associated Gas[J]. Ship & Ocean Engineering, 2011, 40(1): 135-139.

[4]. Wang Fei fei, Cao Feng, Shu Peng cheng. Research Progress of the Vortex Tube[J]. Fluid Machinery, 2008, 36(4): 68-72.

[5]. Yang Ke qing, Wang Tie. Transportation of Associated Gas in Oilfield[J]. Petrochemical Industry Application, 2012, 31(1): 104-106.

[6]. Coker D T, Freemann B T, FlemingGK. Modeling multicomponent gas separation using hollow-fiber membrane contactors[J].American Institute of Chemical Engineering Journal, 1998, 44: 1289-1302.

[7]. Guo Kui chang. A Primary Discussion on Comprehensive Utilization of Oilfield Associated Gas[J]. Oil-Gasfield Surface Engineering, 1986, 5(6): 1-7.

[8]. Su Xin, Wang Sheng lei, Zhang Lin. Countermeasures and Current Situation of Oil Associated Gas Utilization [J]. Natural Gas and Oil, 2008, 26(2): 33-37.

[9]. Liu Jie ying. Light Hydrocarbon Recycling in Natural Gas[J]. Journal of Yulin College, 2008, 18(2): 76-78.

[10]. Li Fa yin, Song Kao ping. A New method to estimate annual increment of recoverable reserves of oil and gas fields[J]. Special Oil & Gas Reservoirs, 2011, 18(3): 68-70.

[11]. Jiang Huai you, Li Zhi ping, Feng Bin. Present situation and prospect of submarine oil-gas-water separation technology in word offshore oil industry[J]. Special Oil & Gas Reservoirs, 2011, 18(3): 7-11.

[12]. Ma Xiao ping. Development of Automobiles of Natural Gas[J]. Agricultural Equipment & Vehicle Engineering, 2011, 1: 1-3.

[13]. Yan Jia de. Vehicle emission pollution investigation[J]. China New Technologies and Products, 2011, 12: 186.

[14]. Gong Yan wu, Jin Ying, Jiang Jin hua. Study on the Project of Liquefied Associated Gas as City Gas[J]. Chemical Engineering of Oil and Gas, 2004, 34(1): 14-16.