125. Transmission Of Dera Bugti, Baluchistan Gas Condensate Through Pipelines Economically

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ABSTRACT

Gas condensate (GC) transportation is very challenging task in the oil and gas industry due to presence of wax and paraffin at the low temperature areas or winter season in the Pakistan. GC settle down or freezes on the pipe line walls and resists transportation of GC. Without addition of additives in the GC, it may not be transported economically through pipeline from well head to refinery or storage tanks. There are many techniques to improve GC flow properties, such as addition of kerosene, lighter gas condensate and different types of alcohols, used by the number of researchers.

The current work is focused on the use of kerosene as an additive in the GC transportation at low temperature environment of district Dera Bugti, Baluchistan. Viscosity, cloud and pour point and density were the parameters of GC and kerosene that were analyzed. Kerosene concentrations were used from 0% to 2% with 0.5% interval in the GC at the temperature of 15ºC. From the experimental work, the viscosity of GC1 without addition of kerosene concentration was 19.88cSt. While with addition of 2% kerosene in the GC1, the viscosity decreased and measured as 19.44cSt. Similarly, GC2 samples were analyzed, without kerosene concentration in GC2 and the viscosity was found as 16.74cSt. With addition of 2% kerosene in GC2, its viscosity was reduced and measured as 16.40cSt. Kerosene found strong and powerful additive because only 2% of kerosene improve flow of GC at low temperature environment, without changes in GC composition. The transmission cost of kerosene is much lowers then other additives.

1. INTRODUCTION

Gas condensate (GC) comes from oil and gas wells and it convert gas to into liquid at ambient temperature, where temperature and pressure of GC become down[1-4]. From the long term ago GC transmission through pipeline are very complicated task for the industry[5-9]. Transportation of GC need chemical treatment for transmission through pipelines at low temperature environment. Many methods are available for the transmission of GC, such like addition of paraffin oil, thinner, light gas condensate and mixture of alcohols[10-17].

In the current research author used kerosene oil concentrations (0-2.0%) for the transportation of GC through pipeline. Kerosene found effective solvent for the decreasing viscosity of the GC of district Dera Bugti, Baluchistan.

2. MATERIAL AND METHODS

Two different oil and gas fields samples of GC were collected from district Dera Bugti, Baluchistan and assign names figure 2.1 GC1 and figure 2.2 GC2. Kerosene was distilled first before using in GC for the viscosity reduction. Density, viscosity and pour and cloud point also find out for the more accuracy in research work. Figure 2.3 Pycnometer and figure 2.4 electronic weight balance was used for density measurement. Cloud and pour point of samples were analyzed by cloud and pour point apparatus which shown in figure 2.5. For the viscosity checking of all samples at different temperatures cannon Fenske routine viscosity meter was used, as shown in figure 2.6.

Figure 2.1 GC1 sample

Figure 2.2 GC2 sample

Figure 2.3 Pycnometer

Figure 2.4 Balance

Figure 2.5 Apparatus for Cloud & Pour Point

Figure 2.6 Viscometer

3. RESULTS AND DISCUSSIONS

3.1 Basic Properties of GC and Kerosene Samples

The first step of research was knowing basic physio-chemical properties of GC and kerosene samples for the further research convenience.

Table No: 3.1 Basic properties of GC & kerosene

Elements	Density g/ml	Cloud point °C	Pour point °C	Viscosity cSt
GC1	0.773	7	-8	13.12
GC2	0.741	-3	-20	12.68
Kerosene	0.745	--	--	11.02

3.2 Rheological Behavior GC1 at 15°C

The GC1 samples were measured here for the viscosity reduction with help of kerosene concentration from 0 to 2.0% with 0.5% interval at the temperature of 15°C as shown in figure 3.1.

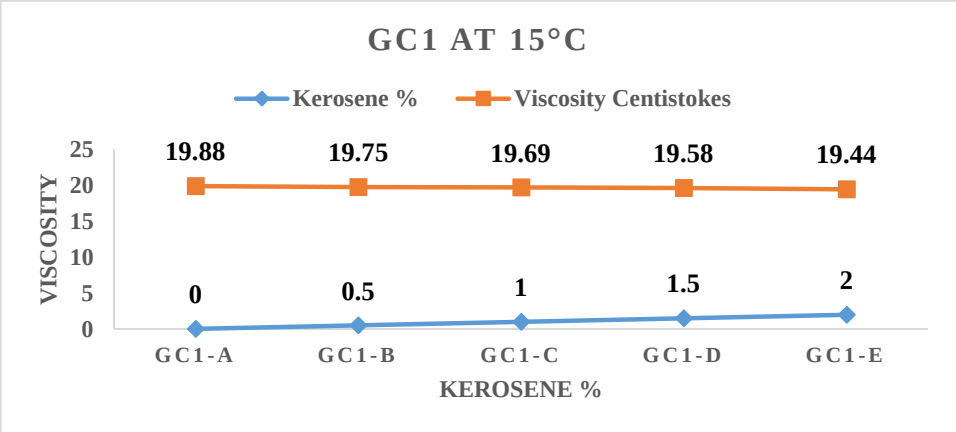

Figure No: 3.1 Viscosity Reduction of GC1

From the figure 3.1 describing the viscosity reduction strategy of GC1 samples at 15°C. At the first experiment of GC1(a) kerosene was 0% and viscosity measured as 19.88cSt. In the second experiment kerosene addition was 0.5% into GC1(b) and viscosity was decreased from 19.88cSt to 19.75cSt. It is cleared from first experiment that only 0.5% of kerosene worked and reduced viscosity of GC1.

Third experiment of GC1(c) was at same temperature and kerosene addition was 1.0% and viscosity decreased from 19.75cSt to 19.69cSt. Fourth experiment of GC1(d), the addition

of kerosene was 1.5% and viscosity was reduced from 19.69cSt to 19.58cSt. At the last experiment of GC1(e) kerosene was 2.0% addition and viscosity reduction from 19.58cSt to 19.44cSt. Total 2.0% of kerosene reduced the viscosity of GC1 from 19.88cSt to 19.44cSt. So it proved that the kerosene as an additive has a potential to reduce the viscosity of GC1 at low temperature environmental. As shown in figure 3.1.

3.3 Rheological Behavior GC2 at 15ºC

The GC2 samples were measured here for the viscosity reduction with help of kerosene concentration from 0 to 2.0% with 0.5% interval at the temperature of 15ºC as shown in figure 3.2.

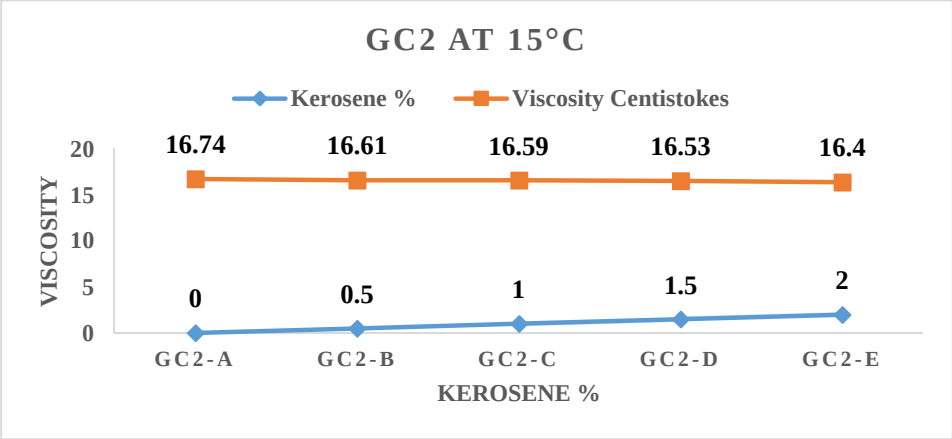

Figure No: 3.2 Viscosity Reduction of GC2

From the figure 3.2 describing the viscosity reduction strategy of GC2 samples at 15ºC. At the first experiment of GC2(a) kerosene was 0% and viscosity measured as 16.74cSt. In the second experiment kerosene addition was 0.5% into GC2(b) and viscosity was decreased from 16.74cSt to 16.16cSt. It is cleared from first experiment that only 0.5% of kerosene worked and reduced viscosity of GC2 at 15ºC.

Third experiment of GC2(c) was at same temperature and kerosene addition was 1.0% and viscosity decreased from 16.16cSt to 16.59cSt. Fourth experiment of GC2(d), the addition of kerosene was 1.5% and viscosity was reduced from 16.59cSt to 16.53cSt. At the last experiment of GC2(e) kerosene was 2.0% addition and viscosity reduction from 16.53cSt to 16.40cSt. Total 2.0% of kerosene reduced the viscosity of GC2 from 16.74cSt to 16.40cSt. So it proved that the kerosene as an additive has a potential to reduce the viscosity of GC2 at low temperature environmental. As shown in figure 3.2.

4. ECONOMICAL ANALYSIS FOR ADDITIVE SELECTION

Every industry demand for the economical additive for the GC transportation through pipelines. In the figure 4.1 showed the prices of different additive, which is used for the viscosity reduction.

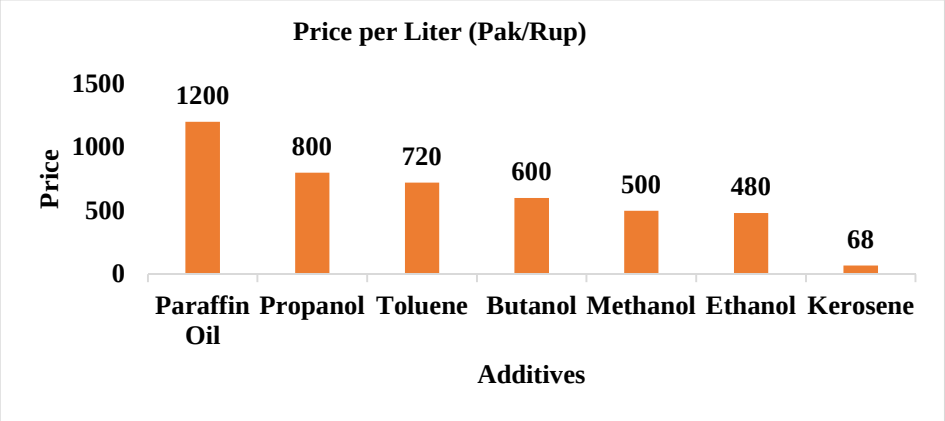

Figure No: 4.1 Price od Additives

From the figure 4.1, paraffin oil has highiest price Rs.1200.00/liter. Propanol is low price than paraffin Rs.800.00/liter, toulene is cheaper than propanol Rs.720.00/liter. Butanol is Rs.600.00/liter, Methanol Rs.500.00/liter, Ethanol Rs.480.00/liter and kerosene Rs.68.00/liter. So the kerosene has proved low cost additive from the figure.

4.1 Production of GC Cost With Different Additives

One of the largest Balochistani oil and gas industry production rate of year 2014-2015 is 54187/barrels. This production of GC is transported through different additives price in figure 4.2.

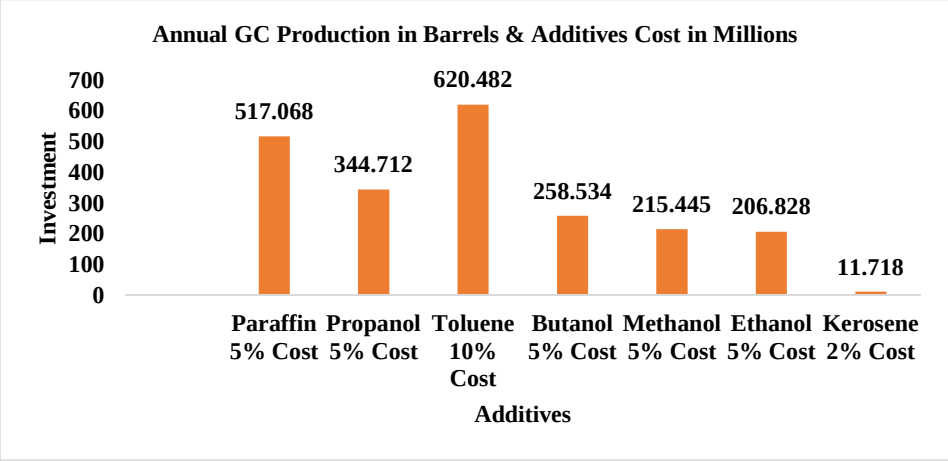

Figure No: 4.2 GC Transportation Cost of Additives

In the figure 4.2, the production rate and transportation charges of different additives are cleare mentioned. Paraffin 5% cost has highiest charges for the production of GC 517.068/millions. Tolune 10% cost is 620.482, low cost alcohol Ethanol 5% cost for the transportation of GC is 206.828/millions and kerosene 2% cost is 11.718/millions. From the figure 4.2 kerosene showed a best additive for the transportaion of GC, first it used only 2%, second low cost additive and last its transportation cost is very low.

5. CONCUSIONS

In the present research, author investigate the how to increase transportation rate of Dera Bugti, Baluchistan GC with help of low cost additive. So kerosene found high potential candidate for the increasing transmission of GC. Concentration of kerosene was from 0 to 2.0% with 0.5% interval in every experiment at the 15ºC. kerosene concentration was also low (2%) as compare with other researchers (5-10%) used in literature.

6. ACKNOWLEDEMENT

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