ACTA SCIENTIFIC MICROBIOLOGY (ISSN: 2581-3226)

Volume 2 Issue 7 July 2019

Research Article

Investing and Solving Problems Created under the Dew Point in One of the Condensate Gas Reservoirs of Iran

Shiva Asaei*

Department of Petroleum Engineering, Marvdasht Branch, Islamic Azad University, Marvdasht, Iran

***Corresponding Author:** Shiva Asaei, Department of Petroleum Engineering, Marvdasht Branch, Islamic Azad University, Marvdasht, Iran.

Received: May 04, 2019; **Published:** June 12, 2019

DOI: 10.31080/ASMI.2019.02.0268

Abstract

The phenomenon of the loss of gas wells during the exploitation of the field is one of the inevitable issues of production. But the occurrence of this problem, which occurs when the pressure of the reservoir falls below the dew point, causes accumulation of gas condensates adjacent to the well and decreases the permeability of the area. In this study showed that, the condensate well of the shell 30 was acidic in the form of acid chloride acid and the results showed that the amount of skin with the injection of a certain amount of acid was reduced to 1.44. As a result, the pressure drop at the well was caused by Skin, and the negative pressure. This means that the acid helps to produce at lower pressure than the reservoir, resulting in less condensation. The results are also consistent with the wellbeing charts before and after the acid. If the program is not implemented to maintain proper production and treatment of these phenomena, Failure to fulfill production plans and loss of repository power will be a challenge to the company.

Keywords: Gas Condensate Reservoir; Dew Point; Conductivity; Acidizing; Skin

Introduction

Gas condensate reservoirs are different from dry gas reservoir. If we want to make preaise engineering calculations for gas condensate systems, we should know about phase and fluid flow behavior relationship. Condensate drop out occurs in the reservoir as the pressure falls below dew point, finally production decrease significantly and the condensate bank formed is also unrecoverable. A gas condensate reservoir can obstruct an it must be components. Condensate liquid saturation can backlog near a well because of drawdown below the dew point pressure, finally restricting the flow of gas [1]. The decreased gas mobility around a producing well below the dew point caused by condensate blockage, then gas and condensate production decrease because of near-well blockage [2]. When bottomhole pressures dropped below dew point, the productivity of wells in the gas condensate reservoir declined [3]. Although the other energy is attracting worldwide but gas and petroleum are the main energy supply in the next decade, with the decline of productivity in recent years, EOR methods is essential to improve of gas reservoir in years to come. The operation of acidizing does with aim of stimulating the oil and gas producing classes and the flow of these classes into the wells.

The part of the goals of acidizing of production formations in oil and gas field are rehabilitation of wells, opening the pores of production, increase production, increasing the permeability of formation, well cleaning, washing and cleaning pipes, release of drilling pipes, and generally reduction of skin coefficient in the formation [4]. By removing flow limits that exist near the wellbore or by varying the pattern of flow towards the wellbore caused of productivity improvement that it is the process of increasing production from oil or gas wells. There are two reasons of reduced productivity which can enhanced by acid treatments First, near wellbore formation damage can reason a well to products at rate minor than the correct reservoir flow capacity. This problem can be resolved by a matrix acidizing management. The second reason is reduced reservoir permeability. This restriction can be reduced through the use of a altered acid stimulation method distinguish acid fracturing [5]. According to studies the purpose of this study is investing and solving problems created under the dew point in one of the condensate gas reservoirs of Iran.

Materials and Methods

By choosing a gas condensate reservoir and entering reservoir information in the Saphir software, we want to obtain well and reservoir features by creating a pressure pulss (Shutting and producing well). Following the drop of pressure in reservoir, the data that we take is around the well. The first data that we take show wellbor storage, and in continues of well testing run, we see skin, now we investigate pressure and rate data of this well that has high skin in Saphir software. After that, this well to be examined under

acidizing by using Stimcade software finally, data of this well after acidizing to be examined in Saphir software.

Well testing before acidizing

As in logarithmic graphs (figure 1) the result of Saphir software shows, this gas condensate well has a skin value of 30. That the pressure drop comes from skin is 1027 psia. As a result of this pressure drop caused by reservoir production with rate 10000 Mscf/D and condensate 4 STBD, The pressure is reached under the pressure of the dew point (4600 psia) and in result of condensate production we can see skin effect and rate of gas production has reduced. Above figure shows that reservoir model according to reservoir information is in the form of carbonate reservoir with transient production. Reservoir and well model is shown in figure 2. Also pressure and rate graphs of this well that they are in the case of buildup welltesting are shown in figure 3 and 4. As these figures and figure 1 show that created model match up well with real pressure and rate model and the results are reliable.

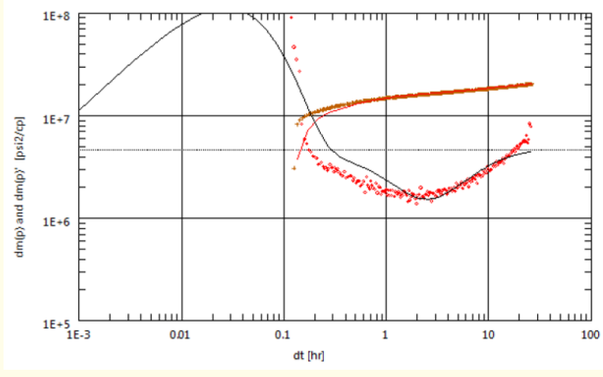

Figure 1: Graph of the logarithmic pressure and the compressive derivative before acidizing.

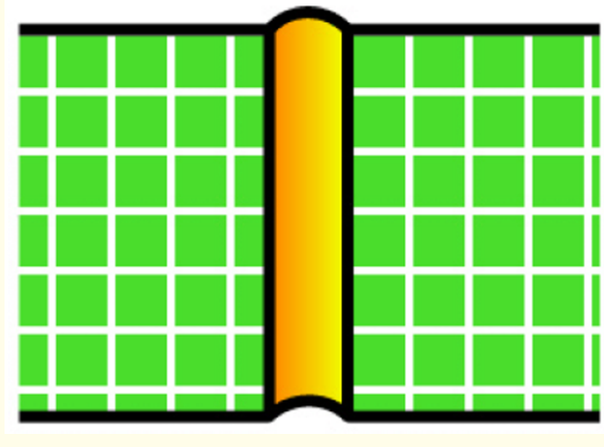

Figure 2: Fracture reservoir and well model.

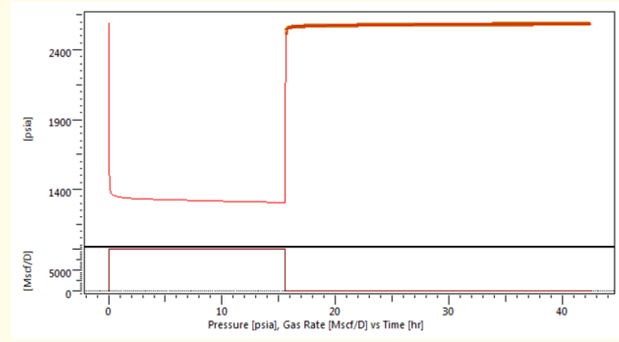

Figure 3: Real rate graph and welltesting model.

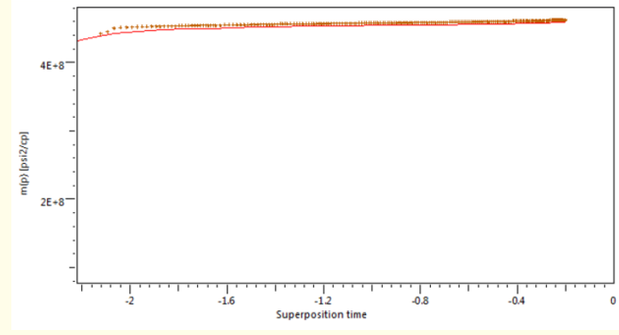

Figure 4: Real pressure graph and welltesting model.

Acidizing to reduce the effect of skin

Acidizing according to petrology considerations was considered for reducing skin effect. In this study, reservoir rock was considered carbonate with 98% calcite 2% dolomite. Acid range is 150 ft which is same the reservoir range in the form of completion of open well. Also in this well production is done by core tubing. Well radius is 8 inch, currently reservoir pressure is 2600 psia. Reservoir permeability has been obtained from well testing data 6.95 md. Type of damage for acid in the form of mixed deposit with the dissolution of 80 in acid is chosed. Considering that reservoir is carbonate, we chose HCL 15% acid, but because the reservoir is fracture, for reducing wasted acid in fracture and better effect on matrix. We consider Gelled HCL 15%, with 28cp viscosity, 77f temperature. Amount 320 acid barrel with rate injection 2 barrel/minute for acidizing is considered. This volume of acid is calculated according to skin radius, primary porosity, reservoir thickness, well radius and fracture pressure. As the figure 5 is shown, this volume of acid impress around the well. Figure 6 shows effect of acid up to a depth of 4 feet from the well into reservoir. As shown in figure 7, At the same time as acid injection the growth pressure occurred in the well, but this growth of pressure is always below the pressure of the fracture and It is matrix acidizing. A desirable result for the use of surface equip-

ments is no need high pressure for acid injection and acid efficiency. Figure 8 shows during the injection of acid, the amount of skin was decreasing from 30, and at the end of the acidizing amount of skin has reached to -1.44. furthermore, the most reduction skin effect occurred in injection volume of approximately 20 barrels of acid. That way amount of skin effect in the injection volume decreased by 20 barrels of acid to 5. Continuing injection of acid volume leads to decrease of skin effect in a negative amount. In addition, figure 9 shows the growth of wormhole during the injection of acid volume, that the growth of such holes will help to better reservoir production.

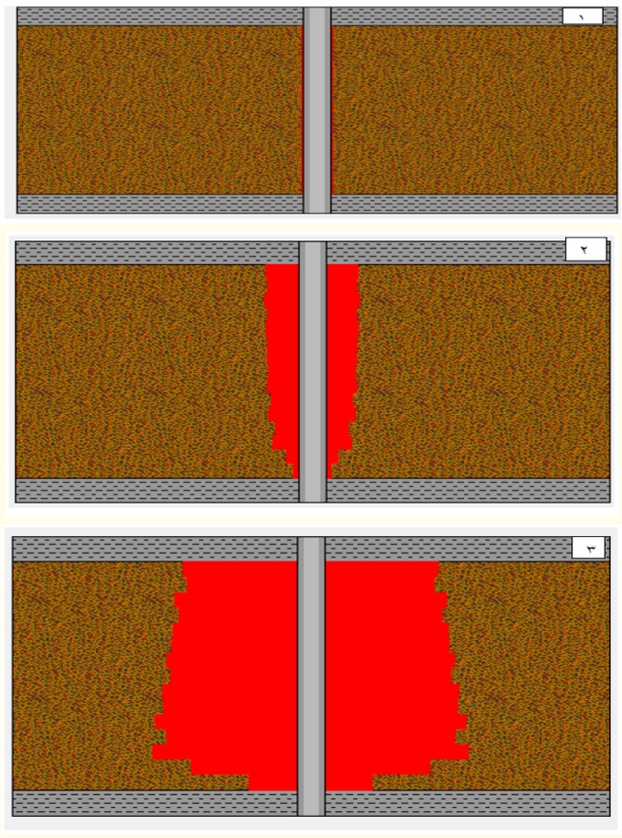

Figure 5: Steps on the effect of acid on the reservoir rock around well, 1- before acidizing, 2- in the early time, 3- end of acid.

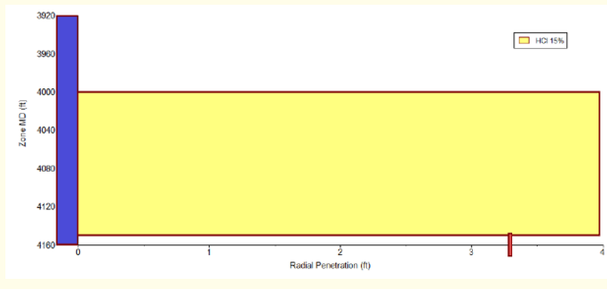

Figure 6: Depth of acid penetration in the reservoir to reduce the effect of the skin.

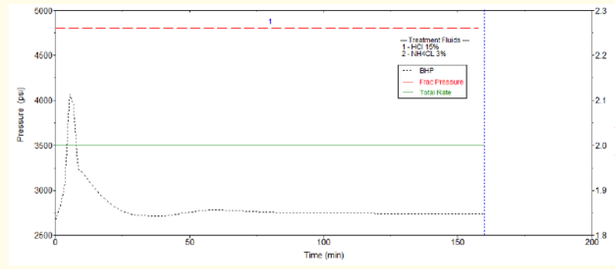

Figure 7: Chart of injection pressure changes in the well.

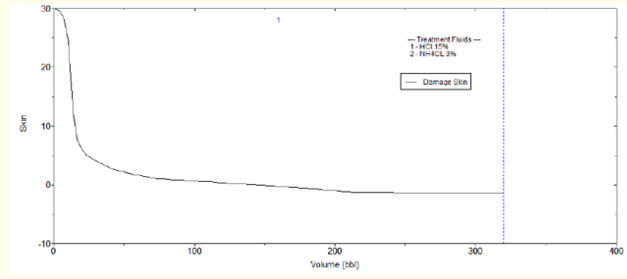

Figure 8: Drop down trend chart of skin during acidizing.

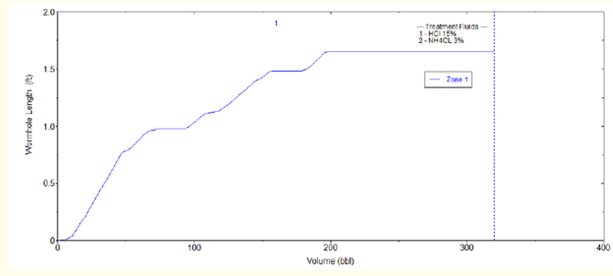

Figure 9: Wormhole growth during acidizing.

Well testing after acidizing

As the results of the acidizing have shown, the amount of skin has a negative value. Therefor this process should be observed in welltesting result. Rate well production graph is shown in figure 10. Result of pressure derivative analysis in the second build up pressure shows that amount of skin has decreased to -1.46. As a result of the pressure drop from the skin has decreased to -303 psia, which helps the well for producing from reservoir that It does not need compensating pressure for skin. According to the results of acidizing and reducing the effect of skin It is expected that well performance index has also improved, so IPR graph was drawn for both before and after acidizing in Saphir software. As shown in figure 12, well productivity after acidizing has grown substantially.

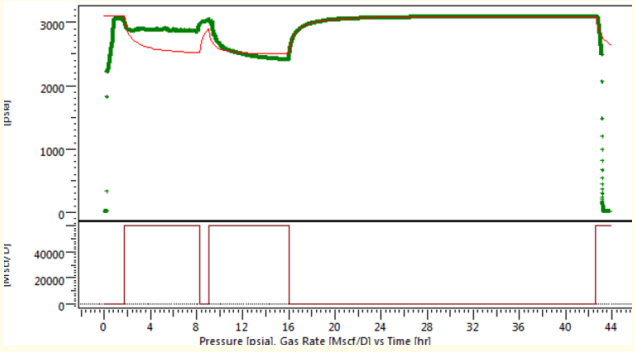

Figure 10: Well production graph after acidizing.

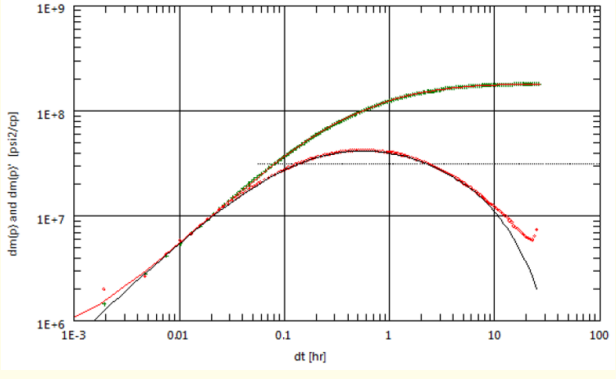

Figure 11: Logarithmic pressure diagram and compressive derivative after acidizing.

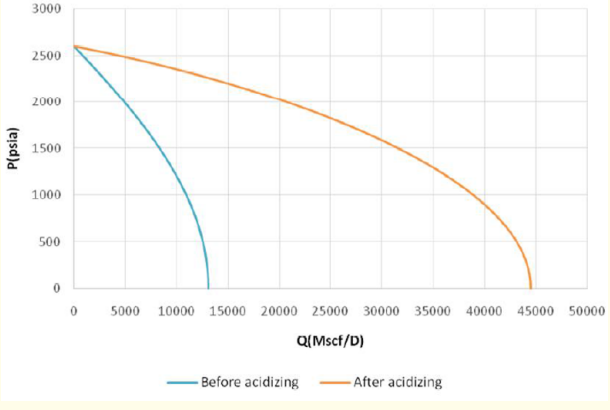

Figure 12: IPR graph after and before acidizing.

Conclusion

Today maximum withdrawal from oil and gas reservoirs with consideration of economic aspects, has become more important than any other time. With eliminating barriers during production reservoir, production is become desirable. Formation damage caused reduction of rate production an extra pressure drop. The most effective way to deal with formation damage is stimulation and motivation of the well, that most commonly of them are acidizing, because the efficiency of acidizing processes in carbonate formation is more than the other lithology [6]. Acidizing is a chemical stimulation method that contains the injection of an acid solution at pressure under the fracture pressure of the formation to make possible improved production by removing the formation damage [7]. Acid treatment contains pumping highly pressurized acid into the well, so dissolving sediments to develop permeability. This process creates channels through which the hydrocarbons can flow [8]. Hydrochloric (HCL) is one of the most important acid that used to stimulate production which is useful in removing calcite materials from reservoirs and used in carbonate acidizing [9]. Hydrochloric acid with Hydrofluoric acid (HF) can dissolve silicate phases from the reservoir rocks [10], and Acetic acid has better results in carbonate reservoirs [11] Matrix acidizing is one of stimulation method that can improve the permeability and get a negative skin [12]. Matrix acidizing treatments has the same purpose in gas well, oil wells or water injection wells to overcome formation damage by restoring or increasing the permeability in the near-wellbore region. But, two-phase gas-liquid flow during acid injection and the viscosity difference between the injected acid and the reservoir gas caused difference in the performance of an acid treatment between gas well and oil production or water injection wells [13]. As mentioned, gas condensate well with skin 30 under acidizing is placed in the form of gel HCL acid, and the results show that skin amount with injection a certain volume of acid has declined to -1.44. As a results, the drop of pressure at the wellhead caused by skin is demolished and achieved to a negative value. It means that acidizing helps to produce in a lawer pressure drop of reservoir. As a result, less condensation will be generated that the results are also matching with well productivity graph after and before acidizing.

Bibliography

1. Afidick D, kaczorowskinj and Bettes production performance of a retrograde gas reservoir: A case study of the arun field". presented at the SPE Asia pacific oil and can conference, melborn Australia. (1984): 28749.

2. Andrews Ry., *et al*. "Quantifying contamination using colar of crude and condensate". oilfield review 13.3 (2001): 424-430.

3. El – Banbi AM., *et al*. "Investigation of well productivity in gas condensate reservoir". presented at the SPE/CERI Gas technology symposium Calgary (2000): 59773.

4. Esmaeli Abdollah. "Acidizing of formation for improving oil recovery in one of reservoir of southern Iran. Monthly magazine, promoting exploration and production oil and gas (2013): 106.

5. Waynemuecke Thomas. "Principles of Acid stimulation. (Exxon production Research Co.). SPE -10038 – MS Publisher: society of petroleum engineers". International petroleum Exhibition and Technical symposium, Beijing, china. (1982).

6. Hadadi Mohamad and Momeni mianaee Ahmad "Carbonate acidizing and study of acid result at one of oil wells located in one of the center oil fields. proceedings of the 4th national conference on hydrocarbon reservoirs and upstream industries". Iran, Tehran, center for sound and Tv conferences. (2015).

7. F Civan. "Reservoir Formation Damage: Fundamentals, Modelling, Assessment and Mitigation" 2nd Edition, Gulf professional Publishing, Texas, USA. (2000).

8. A Bale., *et al*. "Stimulation of Carbonates Combining Acid Fracture with Proppant (CAPF): A revolutionary Approach for Enhancement of Final Fracture Conductivity and Effective Half Length". Paper SPE 134307 Presented at the SPE Annual Technical Conference and Exhibition, Florence, Italy (2010).

9. FF Chang., *et al*. "Matrix Acidizing of Carbonate Reservoirs using Organic Acids and Mixtures of HCL and Organic Acids, Paper SPE 1106601, Presented at the SPE Annual Technical Conference and Exhibition held in Denver, Colorado (2008).

10. BJ Patton., *et al*. "Matrix Acidizing Case Studies for the point Arguello Field". In: SPE Western/AAPG Pacific Section Joint Meeting, (2003): 1-8.

11. T Huang., *et al*. "Carbonate Matrix Acidizing with Acetic Acid". (2000): 58715.

12. Zoidavian por Mansor., *et al*. "Investigating and improving the operation of well motivation with matrix acidizing in southern oil reservoir, year 20 (2010).

13. D Zhu., *et al*. "Matrix acidizing in gas wells". society of petroleum Engineers. SPE/CERI Gas Technology symposium, Calgary, Alberta, Canada. (2000).

Volume 2 Issue 7 July 2019