Study of Gas Condensate Reservoir Behaviour using PVT Experiment

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Abstract

One of the important activities in reservoir management is to ensure that representative reservoir fluid samples are obtained by sampling and proper laboratory measurements are conducted on the samples. Gas-condensate reservoirs are among the most difficult problems in practical Reservoir Engineering. In case the reservoir is saturated (which is the most frequent) it is impossible to obtain a representative reservoir fluid sample, because any production will create a draw down at well bore level, and some condensed liquid will be left in the formation. Furthermore, behaviour of a gas condensate reservoir is mainly controlled by fluid properties, and accurate knowledge of these PVT characteristics is required. The purpose of this study is to highlight experimental PVT data obtained from the standard experiment performed on a surface sample of a gas condensate. Indeed, the constant volume depletion (CVD) and the constant composition expansion (CCE) are the major laboratory tests for gas condensate. The PVT data obtained are based on the analysis of the recombined surface sample.

Keywords: Fluid sampling, PVT experiment, Gas condensate, CCE/CVD,

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1. Introduction

The importance of a good knowledge of the phase behaviour and compositional properties of reservoir fluids for the development of gas condensate reservoirs and the subsequent processing of the well stream is widely recognised. Substantial financial investment is made on the acquisition of reliable samples of a reservoir fluid and on measuring the phase

Table 2 CVD Experiment result

Pressure (Psig)	*% Prod (1)*	*Deviation Factor Z*	*Bg*100 (m3/m3)*	*% Liquid Deposit (2)*
4565	**-**	**0.964**	**-**	**-**
4500	6.47	0.958	0.404	0.15
4000	17.48	0.922	0.438	1.34
3000	28.57	0.877	0.555	4.29
2500	40.64	0.871	0.660	5.15
2000	53.27	0.877	0.830	5.40
1500	66.07	0.893	1.124	5.25
1000	76.48	0.918	1.726	4.77

(1) Retrograde liquid deposit in volume % of sample volume at dewpoint

Figure 4 Gas formation volume factor

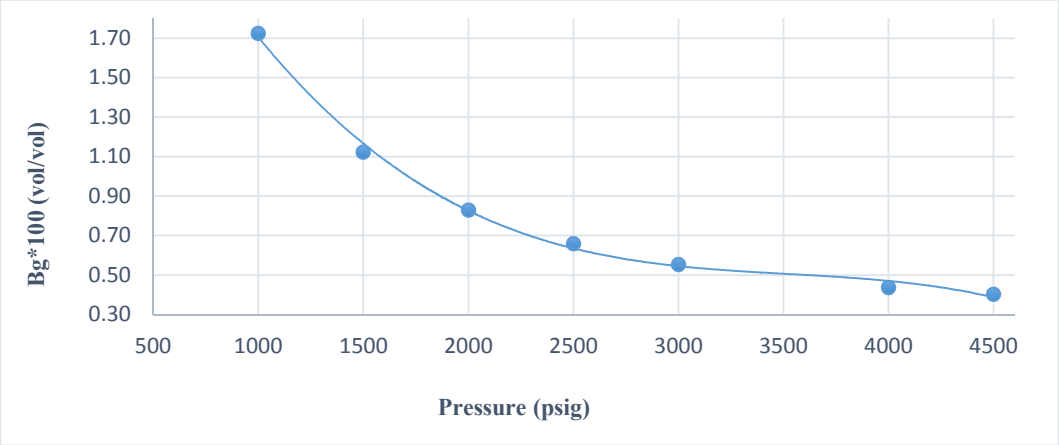


Figure 5 Deviation factor from CVD Experiment

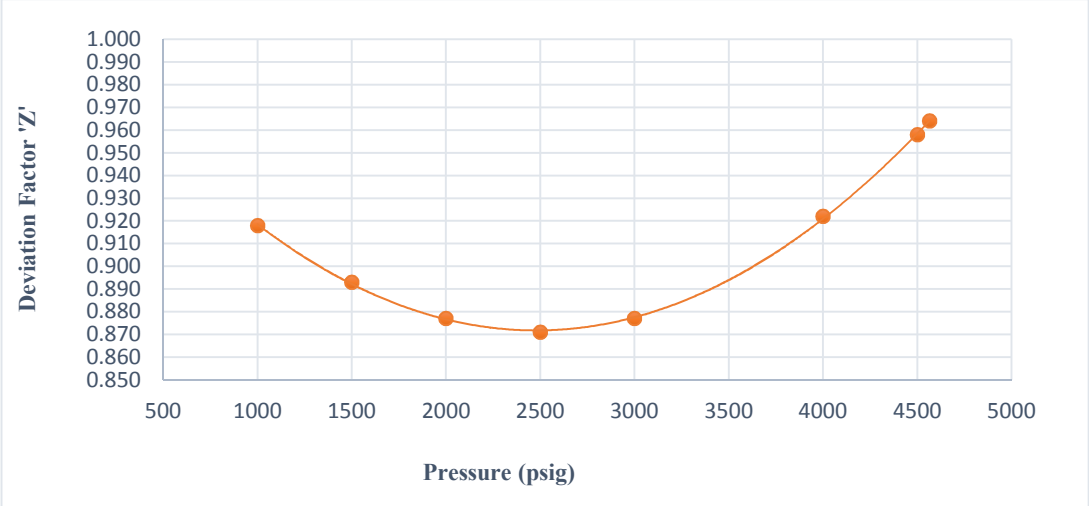
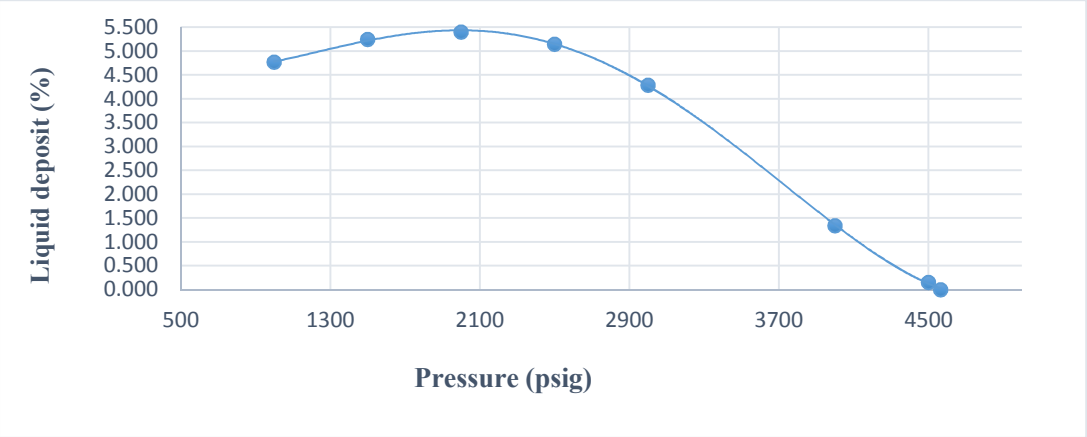


Figure 6 - Liquid deposit



(2) Retrograde liquid deposit in volume % of sample volume at dewpoint

Figure 1: Schematic diagram of constant volume depletion

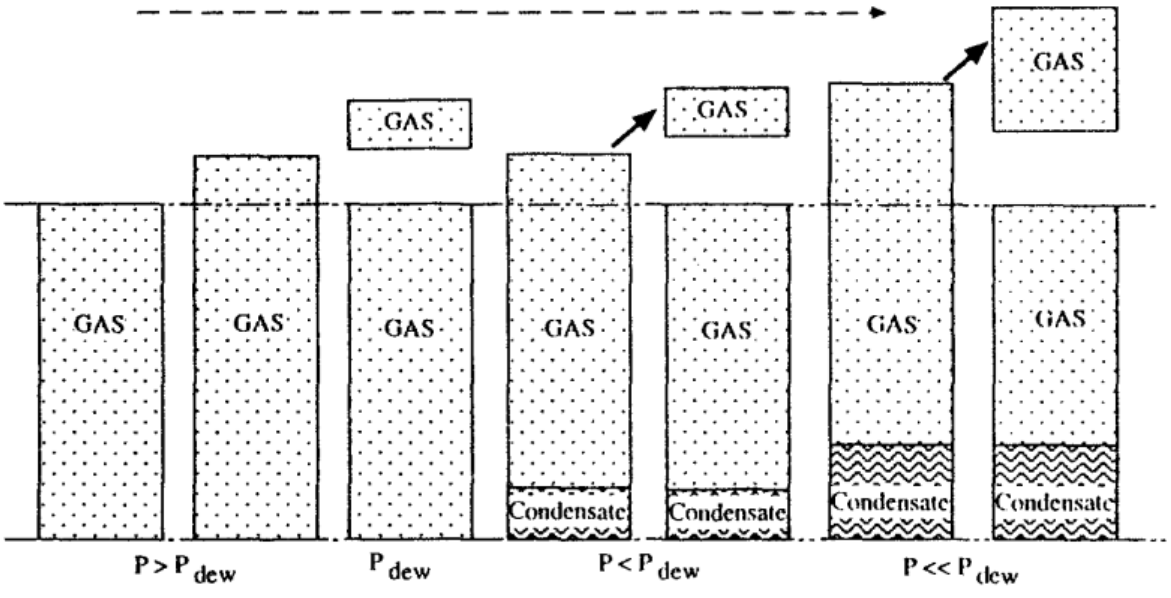


Figure 2 PV analysis laboratory

Table 3 Molair composition of liquid and gas separator analysed by GC

Constituants	***MW (g/mole)***	***molaire du gaz séparateur et du Liquide séparateur (%)***	
		molaire Du gaz séparateur (%)	***molaire du liquide séparateur (%)***
N2	28.014	1.67	0.41
CO2	44.010	1.00	0.07
C1	16.041	77.37	2.96
C2	30.070	11.25	2.08
C3	44.097	4.80	3.28
iC4	58.124	0.73	1.32
nC4	58.124	1.46	4.21
iC5	72.151	0.41	3.18
nC5	72.151	0.40	4.41
C6	86.178	0.30	11.77
C7	96.000	0.37	16.20
C8	107.000	0.24	11.15
C9	121.000	0.00	9.74
C10	134.000	0.00	7.02
C11	174.000	0.00	4.81
C12	237.000	0.00	17.38
Total		100.00	100.00
MW (g/mole)		21.55	109.43
DensitY (=air)		0.743	-
GOR(m3/m3)		-	10.92
Bo(3000psig , 38.1°C) (m3/m3)		-	1.061

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