بسما الله الرحمن الرحيم

قال تعالى:

{ سَبِّحِ اسْمَ رَبِّكَ الْأَعْلَى * الَّذِي خَلَقَ فَسَوَّى * وَالَّذِي قَدَّرَ فَهَدَى * وَالَّذِي أَخْرَجَ الْمَرْعَى * فَجَعَلَهُ غُثَاء أَحْوَى }

صدق الله العظيم

سورة الأعلى الآية (1 – 5)

Dedication

For their countless sleepless nights filled with prayers and hopes for my success in life, the least I could do is to dedicate my efforts to the most influential people in my life Father, Mother, Sisters and brothers . . .

The dedication extended to my family members, friends and colleagues.

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First and foremost I must thank "ALLAH "who provided me with power& will till the end of this thesis, also I would like to express my profound gratitude to my parents for their kindness, carefulness along my life and the hard effort they did to get knowledge. Special and deepest thanks to my wife who supported me and provided me with good environment for finishing this job.

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Nomenclature

Symbols

B_o	Oil formation volume factor (bbl/stb)
B_{ofb}	bubble-point oil formation volume factor
B_g	Gas formation volume factor (cft/scf)
B_t	Total volume factor
M	Molecular weight
P	Pressure, psi
P_b	Bubble point pressure, psi
P_r	Reservoir pressure, psi
P_{wf}	Flowing well pressure, psi
q_o	Oil Production Rate, STB\D
R	Universal gas constant
T	Temperature, C°, F°
V	Volume, cm^3
μ	Viscosity, centipoises
ρ	Fluid Density, $\frac{gm}{cm^3}$
γ_g	Gas specific Gravity
γ_o	Oil specific Gravity
Z	Gas deviation Factor

Abbreviations

TRES	Reservoir temperature (^{o}F)
PBP	Bubble point pressure (saturation pressure) (psig or psia)
PDP	Dew point pressure (saturation pressure) (psig or psia)
VS	Volume of the sample at cell temperature and pressure
VBP	Volume of the sample at bubble point pressure
VDP	Volume of the sample at dew point pressure
Vsat	Volume at the saturation pressure
GOR	Gas oil ratio
	Standard volume of gas/volume of sto (scf/stb)
GCR	Gas condensate ratio
	Standard volume of gas/volume of stock tank condensate (scf/stb),
LNG	Liquefied natural gas
	Calculated liquid volume of the gas component as liquid (bbl/mmcf)
PNA	Paraffins, napthenes, aromatics
Rs	Solution gas oil ratio scf/stb
Rsfb	bubble-point solution gas-oil ratio
Rl	Liberated gas oil ratio scf/stb
Vrel	Gas in solution at p and T /volume of stock tank oil (scf/STB) Relative volume
Vt	Total hydrocarbon volume
ng	Number of gas moles
no	Number of oil moles
nc	Number of condensate moles
API	American petroleum institute
GOR	Gas-oil ratio
FVF	Formation volume factor
X-X	The studied Sudanese oil field
OOIP	Original oil in place
PVT	Pressure-volume-temperature
QC	Quality check
RF	Recovery factor
STB	Stock tank barrel
scf	Standard cubic feet
BHS	Bottom hole sample

Abstract

The reservoir fluid properties is the key of oil reserve evaluation and production even using primary production or enhanced oil recovery methods. So we preferred to focus on some of the properties of crude oil that reflect the oil behavior under the pressure and temperature of the reservoir.

The objective of this research to know the properties of a Sudanese oil from new field and the type of it's fluid. And choose the best bubble point correlation which gives a reliable result compeered with the measured one from five correlations.

An experimental Study has been done for a Sudanese crude oil field recently discovered. From the study we get the result of the following properties bubble point pressure, relative volume, oil compressibility, gas oil ratio or solubility, viscosity, density, Z coefficient of gases liberated, oil and gas formation volumes factors, the specific gravity of gas, molecular weight of gas, and oil and gas compositions. According to these properties we describe this type of oil as black oil.

Finally we find that Standing correlation is the best computational methods to predict the bubble point pressure from the five methods, using data from various Sudanese oil fields (93) sample and analyze the results statistically based on the standard deviation and the percentage of errors and pressure difference for samples measured in the laboratory.

تجريد

تعتبر خواص موائع المكامن النفطية مفتاح لتقيم المخزون النفطي وكيفية إنتاجه واستخلاصه بالطرق المحسنة لذلك فضلنا أن نلقي الضو على بعض الخصائص لخام النفط التي تعبر عن سلوكه تحت ضغط وحرارة الخزان.

الهدف من هذا البحث التعرف على خواص الموائع النفطية لخام سوداني لحقل جديد ونوعه. وإختيار أفضل الطرق الحسابية للتنبأ بضغط الفقاعة التي تعطي نتائج مناسبة مقارنة بالمقاسة معمليا من ضمن خمس طرق حسابية.

تم عمل دراسة معملية كاملة لخام سوداني ضمن الحقول المكتشفة حديثا وحددت منها الخواص التالية ضغط الفقاعة ،الحجم النسبي، إنضغاطية الزيت ، نسبة الغاز للزيت أو الذوبانية، اللزوجة،الكثافة،معامل الحيود للغازات المتحررة، معامل التمدد الحجمي للغاز والزيت،الثقل النوعي للغاز ، الوزن الجزيئي للغاز بالإضافة إلى مكونات الغاز والزيت.وبناءا على هذه الخواص تم تصنيف هذا الخام عللى أنه من النوع الثقيل.

وأخيرا وجدنا ان طريقة إستاندنق الحسابية هي أفضل الطرق الحسابية للتنبأ بضغط الفقاعة من ضمن خمس طرق باستخدام بيانات من مختلف الحقول النفطية السودانية (93 عينة) وذلك بتحليل النتائج إحصائيا بناءا على الانحراف المعياري والنسبة المئوية للأخطاء وفرق الضغط بالنسبة للعينات المقاسة معملياً.

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