

Q1) i) Calculating the initial gas reserve of a 160-acre unit of the Bell Gas Field by volumetric depletion and under partial and complete water drive.

Given:

Average porosity = 22%

Connate water = 23%

Residual gas saturation after water displacement = 34%

$B_{gi} = 0.00533 \text{ cu ft/Scf}$ at $P_i = 3250 \text{ psia}$

$B_g = 0.00667 \text{ cu ft/Scf}$ at 2500 psia

$B_g = 0.03623 \text{ cu ft/Scf}$ at 500 psia

Area = 160 acres

Net productive thickness = 44 ft

Calculate:

- Pore volume.
- Initial gas in place.
- Gas in place after volumetric depletion to 2500 Psia.
- Gas in place after volumetric depletion to 500 Psia.
- Initial reserve by water drive at 3250 Psia. $S_g = 34\%$

10 درجات

ii) Data: Bulk Volume = 60,000 acre.ft

Pay Zone Thickness = 60 ft

Total Porosity (ϕ) = 41%

Effective porosity = 22%

Oil Saturation = 72%

$\beta_{oi} = \text{at in. Condition} = 1.2 \text{ resBBL/STB}$

$Q_o = 150 \text{ STB/Day}$

Time Production data = 5 years

Calculate 1 - Stock tank oil in place.

2- Recovery Factor.

5 درجات

Q2) i) What the types of reservoir drive mechanism?

7 درجات

ii) The pressure history of a water-drive oil reservoir is given below:

T, days	P, psi
0	3600 (pi)
100	3450
200	3410
300	3380
400	3340

The aquifer is under a steady-state flowing condition with an estimated water influx constant of 130 bbl/day/psi. Calculate the cumulative water influx after 100, 200, 300, and 400 days using the steady-state model.

8 درجات

Q3) i) Calculate : Water Saturation At under active water drive $S_{gi} = 24\%$, if the Recovery factor 69% at $B_{ga} \cong B_{gi}$

5 درجات

ii) Calculating the water influx when reservoir pressure stabilizes

Given the PVT data :

$B_o = 7.520 \text{ cuFt/STB}$

$B_g = 0.00693 \text{ cuFt/SCF}$

$R_s = 600 \text{ SCF/STB}$

$R = 825 \text{ SCF/STB}$ from production data .

$dN_p/dt = 44,100 \text{ STB/day}$ from production data

$P_i = 2275 \text{ Psig}$

@ 2090 Psig

@ 2090 Psig

initial

$P_{\text{stabilized}} = 2090 \text{ Psig}$

$dW_p/dt = 0$

10 درجات

Q4) i) The following data, Using the reservoir historical data, calculated the water influx by applying the material balance equation. The rate of water influx was also calculated numerically at each time period. Using Craft and Hawkins method

Time, Days	Pressure, Psi	We (10 ³ bbl)	e _w (bbl/day)	Pi - P (Psi)
0	3793	0	0	0
200	3770	25	390	20
360	3706	172	1279	84
549	3643	480	2158	150
733	3547	978	3187	246
915	3485	1616	3844	308
1100	3416	2388	4458	377

Assuming that the boundary pressure would drop to 3380 psi after 1200 days of production, calculate cumulative water influx at that time.

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ii) Calculate the volume of bulk oil zone in (ac-ft) and total formation volume factor and Oil initially in place in a combination drive reservoir.

Given:

Volume of bulk gas zone = 19600 ac-ft

The ratio of initial reservoir free gas volume to initial reservoir oil volume = 0.20

Initial reservoir pressure 2700 Psia

Initial FVF = 1.4 bbl/STB

Initial Gas Volume Factor = 0.0063 ft³/scf

Initial dissolved Gas = 560 SCF/STB

Oil cumulative = 20×10⁶ STB

Reservoir Pressure at the end of the interval = 2210 Psia

FVF (Two Phase@2210Psia = 1.5 bbl/STB

Produced GOR = 700 SCF/STB

Volume of water encroached = 12×10⁶ bbl

Volume of water Produced = 1.0×10⁶ STB

FVF of the water = 1 bbl/STB

Gas volume factor at 2210 Psia = 0.0085 ft³/SCF

7 درجات

بالتوفيق للجميع

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