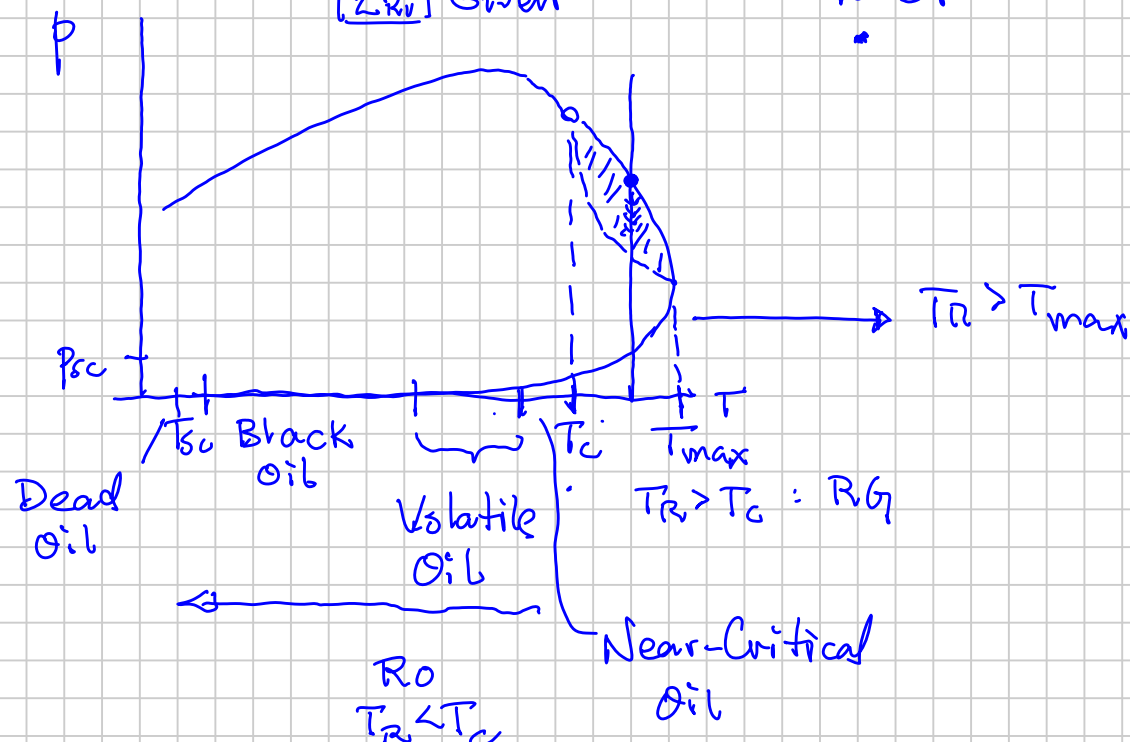


RULES OF THUMB : R_{Gas} vs R_{Oil} (RG) (RO)

Characteristic	RO	RG
Viscosity	≥ 0.3 cp (0.1)	≤ 0.05 cp
Density	≥ 400 kg/m ³	≤ 250 kg/m ³
Saturation Pressure Type	BP @ T_R $[Z_{Ri}]$ Given	DP @ T_R or No DP

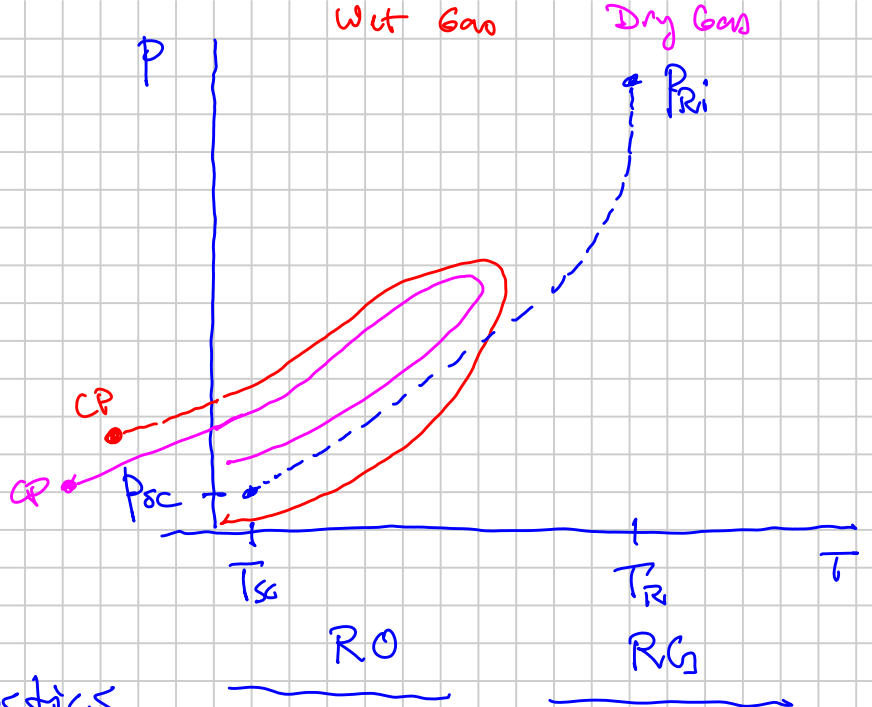


RO: 4 Types
 Less C_1 content ("solution gas")
 the further is T_R from T_c } "GOR"

RG: 3 Types
 Gas Condensate $T_c < T_R < T_{max}$
 { Wet Gas } $T_R > T_{max}$ (*)
 { Dry Gas }

$\frac{1.078}{1000 \text{ scf}} \sim 0.2$
 $\frac{1.078}{450 \text{ scf}} \sim 0.2$
 $\frac{1.078}{2000 \text{ scf}} \sim 0.05$

Depends on Result of Surface Processing



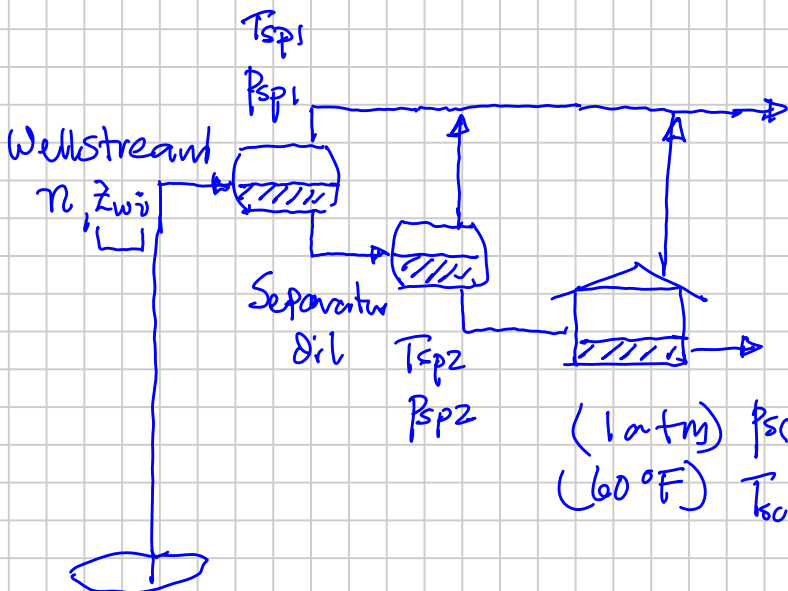
Surface (Processed) Characteristics

GOR = 1/OGR scf/STB Sm ³ /Sm ³	≤ 2500 scf/STB	≥ 3000 scf/STB
OGR = 1/GOR STB/MMscf Sm ³ /10 ⁶ Sm ³	≥ 400	≤ 350 STB/MM

"API" Surface Oil Gravity

✓ γ_o		
γ_{API} (°API unit)	≤ 45	> 50
✓ ρ_o		

Surface Processing



Total Surface Gas	n_g	V_g	m_g
STO Stock Tank Oil			
Surface Oil (\bar{o})	n_o	V_o	m_o
	$\rho_o = \frac{m_o}{V_o}$		
	measured &		

$$P_{\bar{o}} = f(\gamma_{API}) \quad \text{USD } \$/\text{bbl} \quad \checkmark$$

corrected to 60°F
(and 1 atm)

$$GOR = \frac{V_g}{V_o} = f(\text{Surface Process})$$

Specific Gravity

$$\gamma_o = \frac{\rho_o}{\rho_w}$$

scf/STB
Mscf/STB
Sm³/Sm³

0.6 → 1
(0.7-0.9)_{N.S.}

API Gravity

$$\gamma_{API} = \frac{141.5}{\gamma_o} - 131.5$$

$$OGR = \frac{V_o}{V_g}$$

γ_{API}	10	40	70
γ	1	0.825	0.7

STB/MMscf
\$30/STB \$2/Mscf

$$\gamma = \frac{131.5 + \gamma_{API}}{141.5}$$

OGR* that yields same revenue from $\bar{g} \neq \bar{o}$

$$V_g \cdot 2 = V_o \cdot 30$$

Mscf $\frac{\$}{Mscf}$ STB $\frac{\$}{STB}$

$$\frac{V_o}{V_g} = \frac{2}{30} = \frac{1}{15} = 0.067 \frac{\text{STB}}{\text{Mscf}} \times \frac{1000 \text{ Mscf}}{\text{MMscf}} = 67 \frac{\text{STB}}{\text{MMscf}}$$

\$110/bbl \$3/Mscf

$$OGR = \frac{3}{110} = 0.027 = 27 \frac{\text{STB}}{\text{MMscf}}$$

Surface Oil comes from Reservoir Gels \Rightarrow "Surface Condensate"