

MISCIBLE GAS INJECTION

(Pore Level Recovery)

$S_{oi} \rightarrow 0$ where swept

- First Contact Miscible (FCM)

- Multi-contact / Developed Miscibility

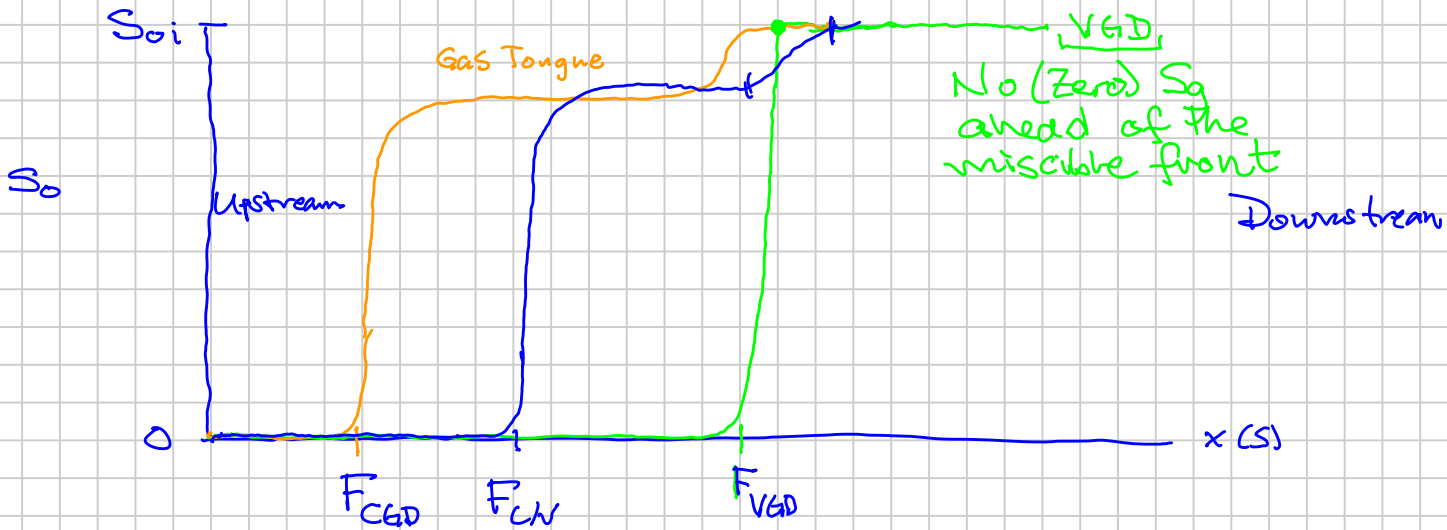
Location of Front
 Downstream - • VGD (Vaporizing Gas Drive)

Upstream - • CGD (Condensing - " -)
 "non-existent"

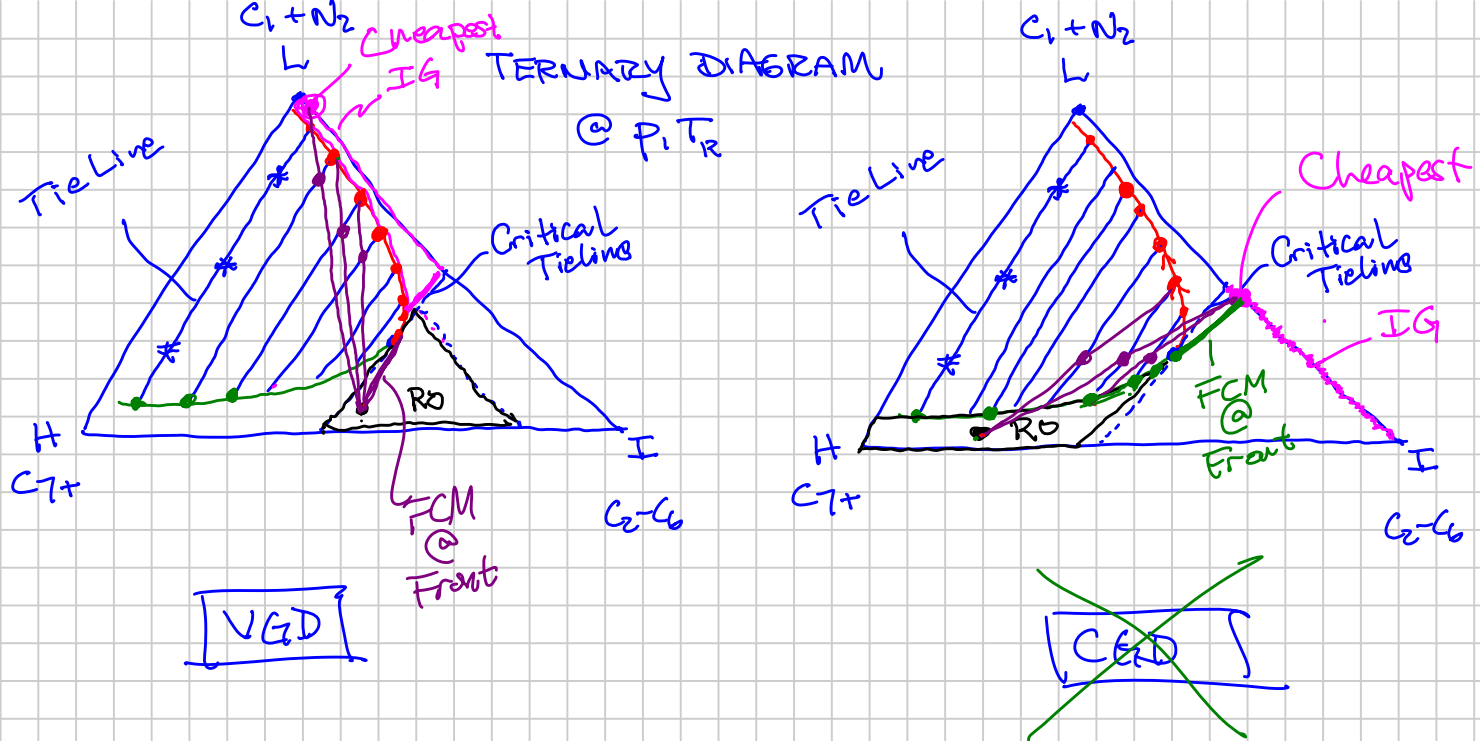
Midstream - • C/VGD (Condensing/Vaporizing)
 90% Zick 1986/87

K-values!
 $K_i (p_o z_i)$
 *
 Altered
 Frontal Gas
 Frontal Oil

Frontal Gas $\frac{1}{2}$
 Frontal Oil

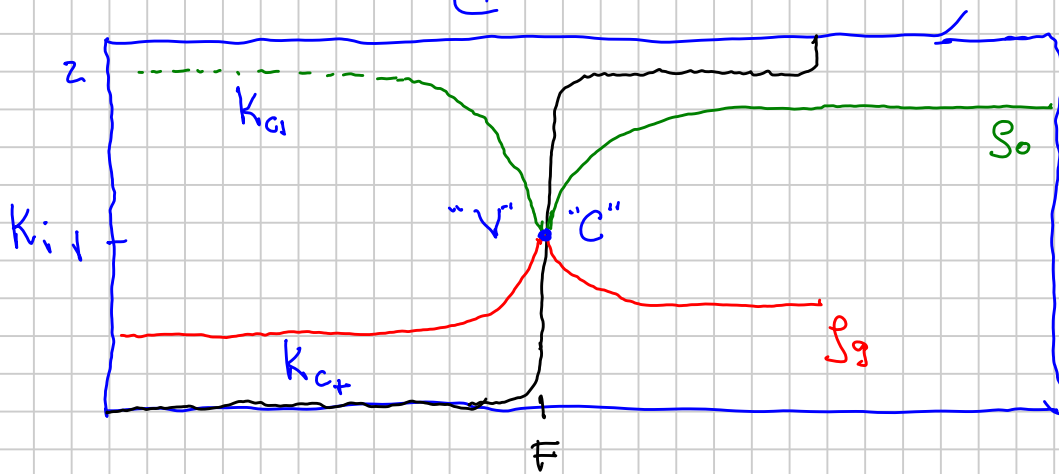


* Development of an altered "frontal" gas and/or "frontal" oil \Rightarrow frontal phases become FCM



C/V Gas Drive "Signatures"

@ 0.5 PVI



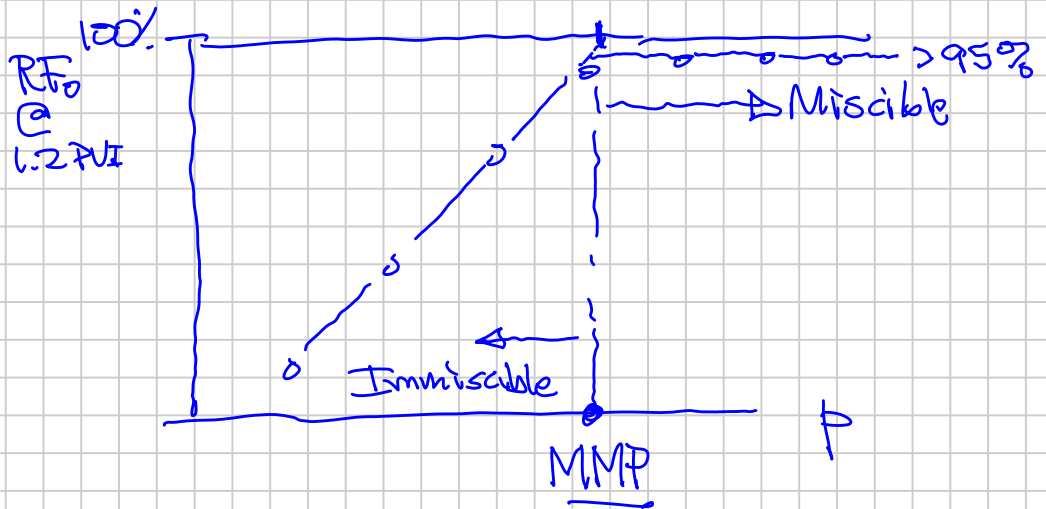
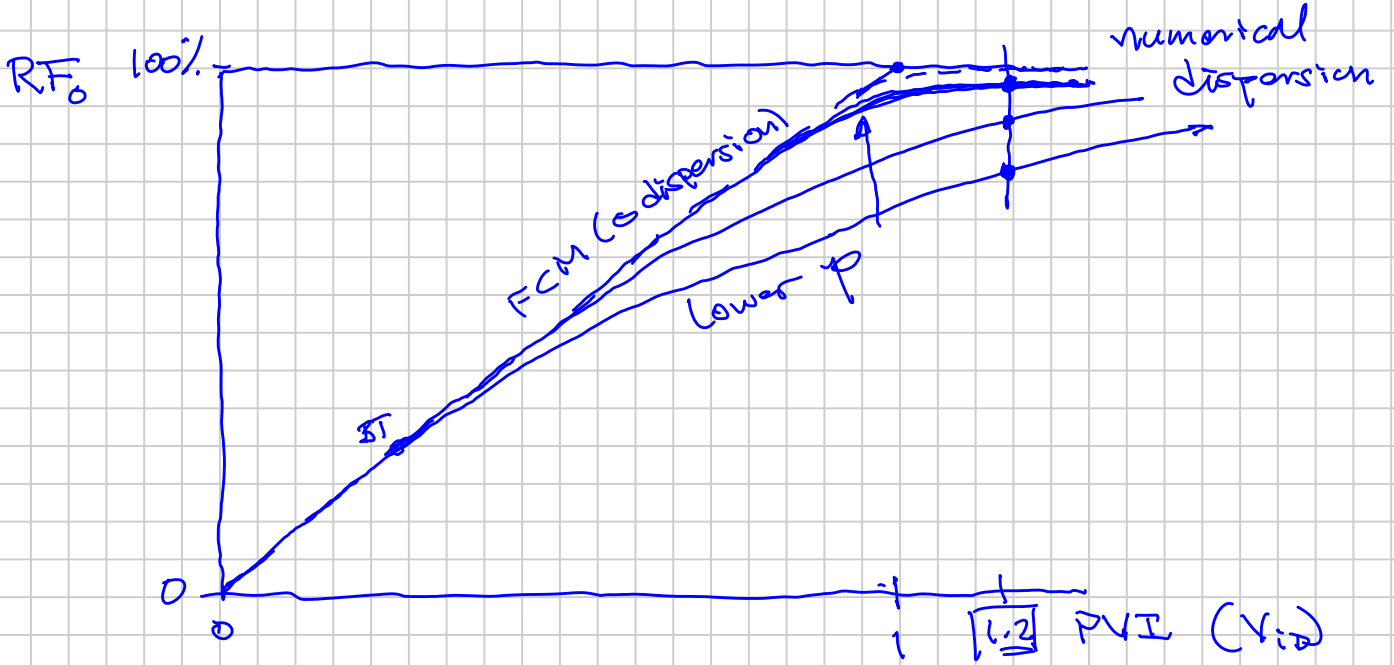
Hour-Glass Signature S_g/S_0 K_{c1}/K_{c+}

Min. 4-components \Rightarrow c/v Miscibility

Method of Characteristics

IG + RO \Rightarrow Develops Miscibility, or not

- Experimentally (Slimtube: 1D packed tube) \Rightarrow min physical disp
- Computationally (1D horizontal: many many cells \Rightarrow min numerical dispersion)



EOS-based 1D Simulations \Rightarrow MMP

- EOS model needs to be "good"

complex phase behavior

APT lab measurements

near critical points

- IMPES formulation

$CFW \sim 1$

- Sufficient grid cells to eliminate /
 minimize numerical dispersion

not real mixing of
 frontal gas and
 frontal oil

@ $p < MMP$

