

“COLLOIDAL DISPERSION” GELS (CDG) (ALUMINUM-CITRATE-HPAM, but sometimes low concentration Cr(III)-ACETATE-HPAM)

Two central claims have been made over the past 30 years. Two additional claims are more recent:

- 1. The CDG only enters the high-permeability, watered-out zones—thus diverting subsequently injected water to enter and displace oil from less permeable zones.**
- 2. The CDG acts like a super-polymer flooding agent—add ~15-ppm Al to 300-ppm HPAM and make it act like a much more viscous polymer solution.**
- 3. The CDG mobilizes residual oil.**
- 4. The CDG acts like “Bright Water” (In depth profile modification)**

Examination of Literature on Colloidal Dispersion Gels for Oil Recovery: <http://baervan.nmt.edu/groups/res-sweep/media/pdf/CDG%20Literature%20Review.pdf>

CDGs cannot propagate deep into the porous rock of a reservoir, and at the same time, provide F_r and F_{rr} that are greater than for the polymer without the crosslinker.

CDGs have been sold using a number of misleading and invalid arguments. Commonly, Hall plots are claimed to demonstrate that CDGs provide more F_r and F_{rr} than normal polymer solutions. But Hall plots only monitor injection pressures at the wellbore—so they reflect the composite of face plugging/formation damage, in-situ mobility changes, and fracture extension. **Hall plots cannot distinguish between these effects—so they cannot quantify in situ F_r and F_{rr}**

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Laboratory studies—where CDG gelants were forced through short cores during 2-3 hours—have incorrectly been cited as proof that CDGs will propagate deep (hundreds of feet) into the porous rock of a reservoir over the course of months.

In contrast, most legitimate laboratory studies reveal that the gelation time for CDGs is a day or less and that CDGs will not propagate through porous rock after gelation.

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With one exception, aluminum from the CDG was never reported to be produced in a field application. In the exception, Chang reported producing 1 to 20% of the injected aluminum concentration.

Some free (unreacted) HPAM and aluminum that was associated with the original CDG can propagate through porous media. However, there is no evidence that this HPAM or aluminum provides mobility reduction greater than that for the polymer formulation without crosslinker.

Colloidal Dispersion Gels for Oil Recovery:

- Have enjoyed remarkable hype, with claims of substantial field success.
- Would revolutionize chemical flooding if the claims were true.
- Currently, no credible evidence exists that they flow through porous rock AND provide an effect more than from just the polymer alone (without crosslinker).
- Considering the incredible claims made for CDGs, objective labs ought to be able to verify the claims. So far, they have not.