

Potassium Formate Fact Sheet



Oil & Gas: High-Density, Solids-Free Drilling & Completion Brine

Introduction

High-pressure, high-temperature (HPHT) wells demand fluids that hold their properties without relying on suspended solids. As operators move away from corrosive halide brines and barite-weighted muds, potassium formate has emerged as a competitive, solids-free brine for drilling and completion. It delivers high density alongside exceptional polymer and shale stability, protecting the reservoir while improving the operation's corrosion and environmental profile.

Chemical Profile

Chemical Formula: HCOOK (CHKO_2)

CAS Number: 590-29-4

Appearance: White crystalline solid; deliquescent. Supplied as a clear, colorless, solids-free brine.

Solubility: Highly soluble (~75% w/w at ambient), giving saturated brine densities up to 13.1 lb/gal (1.57 SG) with no added solids.

Classification: Monovalent organic (formate) salt; used as a solids-free drilling, drill-in, completion, and packer fluid.

Key Functions

- **Solids-Free Density:** Reaches up to 13.1 lb/gal (1.57 SG) with no weighting solids, avoiding the formation damage and rheology issues of solid-laden muds.
- **Polymer & Thermal Stabilization:** Shields biopolymers and starches from thermal and oxidative breakdown, staying stable in HPHT wells (~400°F / 200°C).
- **Shale & Reservoir Stabilization:** Inhibits hydration, swelling, and dispersion of reactive shales and clays, preserving wellbore stability.

Benefits

- **Corrosion & HSE Profile:** Far less corrosive than halide brines, non-toxic, and readily biodegradable.
- **Reservoir Friendly:** Low solids minimize permeability loss and formation damage, supporting higher production.
- **Operational Efficiency:** Lowers fluid maintenance cost, raises ROP, and is recoverable and reusable across wells.

Technical Considerations

- **Density & Blending:** Pure brine spans ~8.4–13.1 lb/gal; blend with sodium or cesium formate to reach up to 19.2 lb/gal.
- **Compatibility:** Verify compatibility with formation water and reservoir mineralogy; reservoir-specific testing advised at high temperatures.
- **Handling & Storage:** Maintain alkaline pH (~9.5–10) for stability. Solid is deliquescent—store sealed. Standard PPE.

Use Cases

- **HPHT Drilling:** Reservoir drill-in fluid for HPHT wells needing solids-free, thermally stable systems.
- **Completion & Packer Fluids:** Clear fluids for perforating, gravel packing, and packer service.
- **Reactive Shale Sections:** Water-sensitive shale intervals prone to swelling and instability.
- **Reservoir Preservation:** High-value pay zones where low formation damage protects recovery.

FAQ

How dense a fluid can potassium formate reach?
Up to 13.1 lb/gal (1.57 SG) at saturation with no added solids. Blending with cesium formate extends the range to 19.2 lb/gal for the highest-density applications.

Why choose it over halide brines?

It is far less corrosive, biodegradable, and reservoir-friendly, and it stabilizes polymers and shales—advantages halide brines cannot match in demanding HPHT wells.

Can the brine be reused?

Yes. Because the system is essentially solids-free, it can be reconditioned and re-used across multiple wells, lowering lifecycle cost.

Sustainability

Potassium formate is a low-toxicity, readily biodegradable alternative to halide brines and solids-weighted muds, reducing the environmental burden of drilling and completion operations and improving the well's overall HSE profile.

Anodyne's potassium formate is **carbon neutral**, having been produced with CO₂ as a feedstock.

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