EcoSyn®-174

SURGITECH

Leave No Drop Behind

Deep Skin Damage Removal Using EcoSyn®-174

EcoSyn®-174 is a safe yet functional replacement for traditional inhibited hydrochloric acid (HCl) and other commonly used oilfield acid treatments. It is non-regulated by US DOT, Canadian TDG, and carries a triple zero hazardous materials information system score. EcoSyn®-174 is manufactured exclusively with products that meet the U.S. Environmental Protection Agency's (EPA) highest Green Circle Standard in its "Design for the Environment Safe Chemical Ingredients List". These ingredients are verified to be of the lowest concern based on experimental and modeled data.

The standard EcoSyn®-174 formula includes iron control agents, de-emulsifiers and requires no organic acid additions or corrosion inhibitors under most conditions. Due to EcoSyn®-174's low reactivity with steel, the product can be used at a full 30% strength without worrying about damage to wellbore tubulars.

Features & Benefits

- Regulated as Non-Hazardous
    - Non-Toxic
    - Non-Corrosive
    - Non-Fuming
- 100% Biodegradable
- Non-destructive to skin or eyes
- Optimal performance in fracs, SWD wells, injection wells, spearhead treatments, bullhead treatments and cement remediation
- Safe with most metals, piping, and pumping equipment
- No organic acid required
- No additional corrosion inhibitor required except in high temperature applications

What is EcoSyn®-174

- EcoSyn®-174 is a man-made product that has dissolution properties similar to HCl, but without the high rates of corrosion and reactivity
- Reactions comparable to high-strength mineral acids or low-strength organic acids
- Pre-mixed with surfactant/de-emulsifier and iron control agent
- Requires no additional corrosion inhibitors or retarders
- Has a significantly more linear spend rate than HCl which allows EcoSyn®-174 to react deeper in the pore space

Product Specications

EcoSyn-174® is pre-blended during manufacturing at a dilution rate of 30/70 with water. No further dilution is required. However, the product can be further diluted to meet project requirements; i.e. 50/50 dilution with water would result in 15% equivalent concentration. The product biodegrades over a 10 day period when exposed to the environment. Keep any containers closed when not in use. No special gloves or protective equipment are required for handling, but safety glasses are recommended. For long-term use, EcoSyn®-174 can be stored in approved plastic tanks, fiberglass tanks, and fiberglass-lined acid tanks. Steel tanks can be used for short-term storage. When transferring the product, couplings should be made from 316 stainless steel, polypropylene, or polyethylene. **DO NOT USE WITH ALUMINUM OR OTHER SOFT METAL FITTINGS OR PUMP PARTS.**

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Dissolving Properties

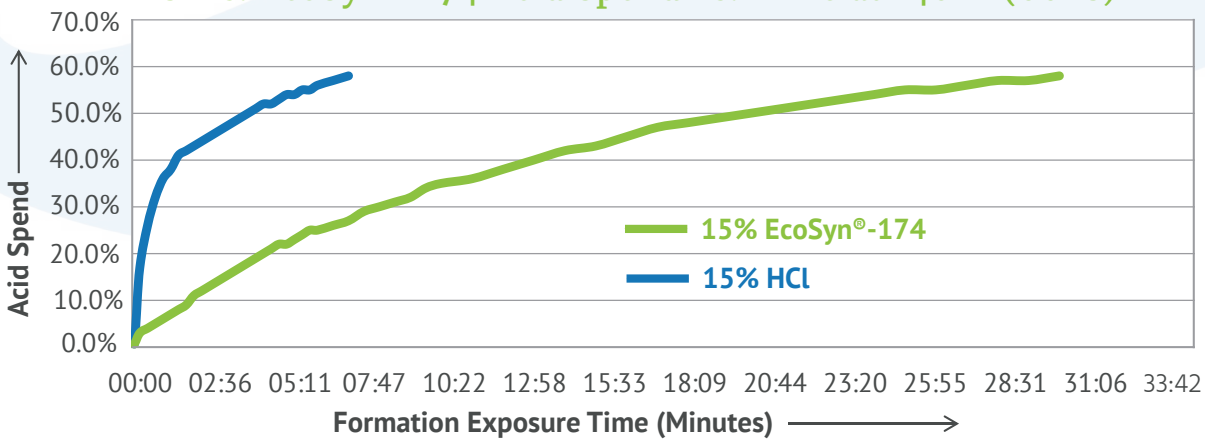
ACID TYPE	% $CaCO^3$
EcoSyn® 30% Solution	100.00%
EcoSyn® 15% Solution	96.76%
15% HCl	87.39%
15% HCl + 100 gpt of 85% Acetic Acid	97.87%
15% Acetic Acid	63.09%

* Tests were conducted by soaking a 1cuin cube of material in 50ml of solution for 8 hours at 100°F

Typical Physical Properties

APPEARANCE AND COLOR	COLORLESS TO SLIGHT YELLOW LIQUID
Initial Freeze Point	Not established
Odor	Odorless-to-mild soapy odor
Solubility in Water	100%
Flashpoint	None
Specific Gravity	1.152 ± 0.04

HCl vs. EcoSyn®-174 Acid Spend vs. Time at 140°F (60°C)



Corrosion Rate of 80L API Carbon Steel at 300°

SOLUTION	TEMP °F	CORROSION RATE mpy	CORROSION RATE mm/y	MASS LOSS lb/ft^2	MASS LOSS kg/m^2
EcoSyn® 30%	300°	402	10.2	0.012	0.06
EcoSyn® 15% Blend	300°	171	4.4	0.005	0.012

Corrosion rate and mass loss for L80 API carbon steel reflects EcoSyn®-174 Neat and EcoSyn-174® 15% Blend after approximately 6 hours of exposure at 300°F.

High-Efficiency Delivery Method

EcoSyn®-174 can be used in traditional stimulation methods, such as acid fracs or squeezes, but is tailored for ultra-deep skin damage removal using SurgiTech's *NitroDyne*® gas delivery process. Using the **Nitro-Dyne®** process, EcoSyn®-174 synthetic acid is converted from a liquid to a fog of 30 micron droplets which are then carried downhole using our high-velocity, hot, inert treatment gas. The treatment gas is injected at 2-3 times the velocity of typical frac rates and carries EcoSyn®-174 to the rock face where the resulting low-viscosity gas and acid mixture can more easily penetrate the pore space.

In traditional acidizing treatments, acid is immediately mixed with existing reservoir fluids that can cause sludge, emulsion, and dilution issues. With the **Nitro-Dyne®** delivery process, the pore space is first purged using a treatment gas/solvent mixture and then full-strength EcoSyn®-174 is carried into the clean pore space, minimizing sludge and emulsion issues. The combination of high-injection velocity, low-viscosity fluid, and EcoSyn®-174's optimal linear spend characteristics allow the product to reach significantly deeper into the pore space before fully reacting with the reservoir rock. This ultra-deep placement technique typically results in EcoSyn®-174 reacting with much more virgin rock than traditional treatments.

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13225 FM 529 • Suite E • Houston, Texas 77041
t: 1 (800) 975-6850 f: 1 (800) 975-6850

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