

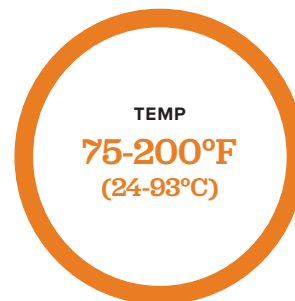
BIOBALLS® L

BUOYANT BIOBALLS® L

DIVERTING FLUID AGENTS

APPLICATIONS AND BENEFITS

- Plug perforations to divert fluid to unopened areas inside the fracture
- Recommended for slickwater, linear gel, cross-linked gel, and acidizing applications
- High mechanical integrity to withstand high pressure environments
- Offered in a variety of sizes 7/8", 1", 1-1/4" (22, 25, 32 mm)
- **For best fluid diversion effectiveness, a 50/50 blend of standard and buoyant BioBalls is recommended.**



PHYSICAL AND CHEMICAL PROPERTIES

BioBalls® L and Buoyant BioBalls® L

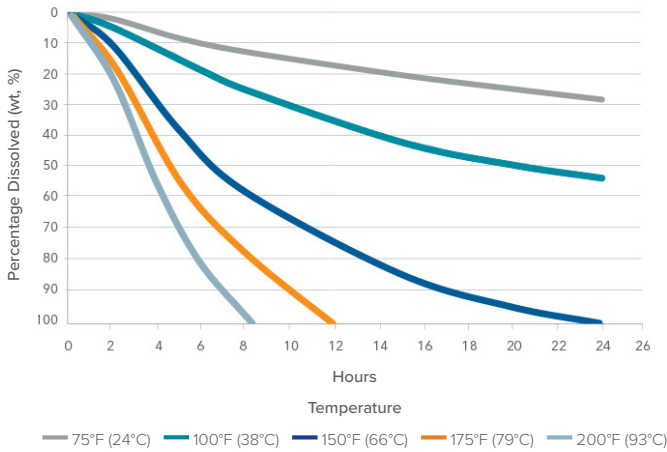
Appearance	Spherical, Blue (standard), Light Blue (buoyant)
Compositions	Polyvinyl Alcohol, and/or Polylactide, and/or Polyester Resin
Specific Gravity	1.18 (standard), range: 0.85-1.05 (buoyant)
Mechanical Integrity	Up to 12,000 psi (82.7 MPa) after two hours soaking in 2% KCl at 175°F (79°C)
Application Temperature Range	75-200°F (24-93°C)
Application pH Range	pH 0-12
Soluble in Polar Solvents	e.g. water, brine, short chain alcohols
Insoluble in Non-Polar Solvents	e.g. BTEX (Benzene, Toluene, Ethylbenzene, Xylene), Diesel, Kerosene
Technical Considerations	Wet the BioBalls in mineral oil prior to placement in the ball injector to avoid clumping. Avoid contact with water or other polar solvents during storage. Mineral oil should comply with local, state, and federal regulations.
Storage Conditions	Unused BioBalls should be stored in a sealed plastic container that is impermeable to hot/wet/humid conditions. Should not be stored in temperatures above 120°F (49°C).

BIOBALLS® L BUOYANT BIOBALLS® L

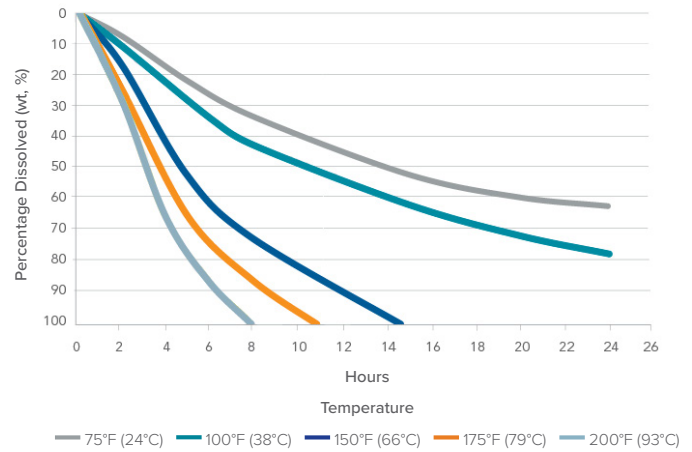
DIVERTING FLUID AGENTS

SOLUBILITY CURVES FOR STANDARD AND BUOYANT BIOBALLS*

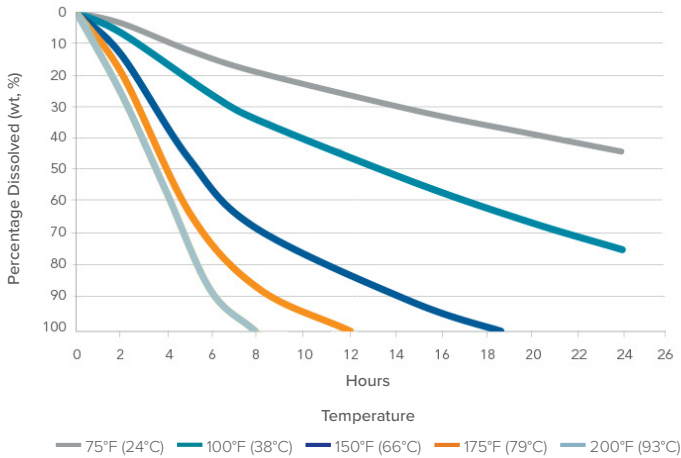
Solubility Profile 7/8" (22mm) in 2% Aqueous KCl



Solubility Profile 7/8" (22mm) in 15% Aqueous HCl



Solubility Profile 7/8" (22mm) in Aqueous NaOH (pH=11)



*A slightly faster dissolution rate is expected for the buoyant than the standard BioBall.

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Covia is a leading provider of high-performance proppant and sand-based products used by oil and gas exploration and production companies to enhance the productivity of their wells. The company also provides high-quality products, strong technical leadership and applications knowledge to end users in the foundry, building products, water filtration, glass, and sports and recreation markets. Its global logistics capabilities include a wide-ranging network of distribution terminals and thousands of rail cars that allow the company to effectively serve customers wherever they operate. As one of the nation's longest continuously operating mining organizations, Covia has developed a strong commitment to all three pillars of sustainable development, People, Planet and Prosperity. Correspondingly, the company's motto and action orientation is: "Do Good. Do Well." For more information, visit CoviaCorp.com.

All information contained herein is subject to change without notice. Data listed above are typical values and have been generated by Covia and/or independent laboratories. Every real-world sampling is different so your results may vary. Covia proppants and activators are compatible with most commonly used water- and oil-based fracturing fluids. Some fluids may require adjustment of pH control, foamer, or breaker loading. Avoid prolonged exposure to highly alkaline fluids. Testing prior to pumping is advised.

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