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Nanoglue

Low-viscosity sand consolidation bond

APPLICATIONS

- Sandstone reservoirs with excessive sand production
- All wells

BENEFITS

- Minimizes effects on production due to sand
- Allows consolidation of even low-permeability sands
- Reduces sand-related damage to surface facilities
- Lowers sand control costs

FEATURES

- Single bonding material for all temperature ranges
- Strong, flexible, chemically stable bond
- Low viscosity, which decreases downhole friction, enabling faster injection rates
- Chemical inertness
- Resistance to water and crude oil
- Ability to form chemical bonds with sand surface and organic component
- Capability of curing organically (i.e., on command by radical polymerization process)
- Enhanced bendability (hardness plus flexibility)
- Temperature stability
- Enhanced mechanical strength

Nanoglue† low-viscosity sand consolidation bond is a material designed to prevent the migration of loose sands and fines from a formation into a wellbore.

Characteristics of hybrid material

The Nanoglue bond is made of a nanostructured silica-based inorganic component blended with an organic polymer precursor. Interpenetrating polymeric networks link the organic and inorganic components together to create a hybrid binding material with a strong attraction to a sand surface and enhanced physical and chemical properties that can be tailored for a wide range of applications. Nanoparticle reinforcement increases mechanical strength, and covalents bonded to sand surfaces enhance the chemical stability.

Advantages over traditional treatments

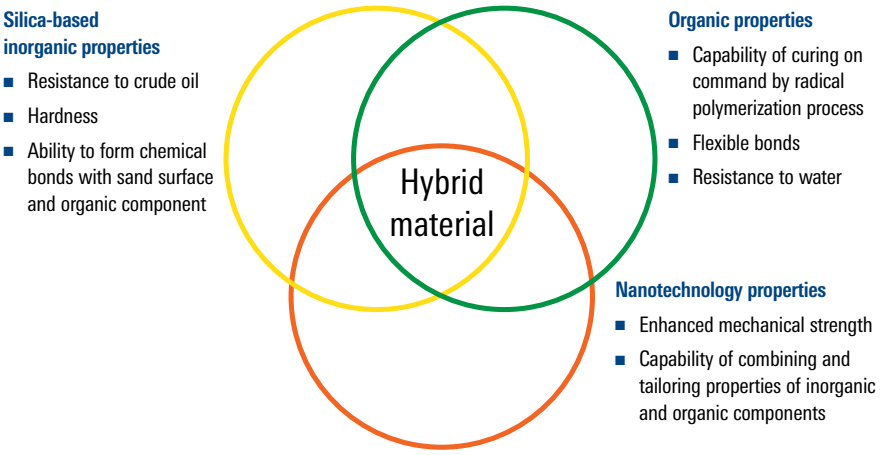
Unlike traditional sand consolidation treatments, such as resins, which are highly viscous and can greatly reduce the original permeability of the formation, Nanoglue bond is characterized by low viscosity that decreases downhole friction, enabling faster injection rates.

Once downhole and set, the glasslike material:

- is chemically inert
- maintains bendability (hardness plus flexibility)
- retains mechanical strength
- resists water and crude oil
- maintains temperature stability
- retains formation wettability.

Activation, injection, and curing

The Nanoglue bond is activated at the surface when an activator material is added. The bond is then injected into the reservoir using a coiled tubing or bullheading process. A preflush treatment is injected to condition the treated zone, after which the Nanoglue bond is injected into the system. A postflush treatment reopens the permeability pores. After it is in place, the Nanoglue bond cures to a hard hybrid material that binds sand particles together.



The Nanoglue bond is made of a nanostructured, silica-based inorganic component blended with an organic polymer precursor. Interpenetrating polymeric networks link the organic and inorganic components on a nanometer scale. After it is cured, the inorganic and organic components form a hybrid material with a strong attraction to a sand surface and enhanced physical and chemical properties.

Nanoglue

The column of consolidated sand (left) was formed by combining Nanoglue bond (center) and sand (right).

Nanoglue Bond Specifications	
Temperature, degF [degC]	113–194 [45–90]
Unconfined compressive strength, psi [kPa]	653–4,500 [4,502–31,026]
Permeability range, mD	200–12,000
Regained permeability, %	40–60
Max. interval length, ft [m]	16.4 [5]
Curing time, days	2.5–5
Viscosity, cp	6–6.5 at 70 degF [21 degC]

slb.com/sandconsolidation

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[1]Nanoglue is a product of AGT and is licensed exclusively to Schlumberger.