

## LEB-4

## ENZYME BREAKER

### Description

LEB-4 is a highly concentrated liquid enzyme breaker. It is used to break water based gels made from any guar or guar derivative including HPG and CMHPG. LEB-4 reduces the viscosity of the gel to less than 15 cP, enhancing clean up and frac water return. When used properly, LEB-4 can significantly reduce proppant pack permeability damage caused by unbroken gel.

### Properties

Form: Liquid	Chemical Family: Protein
Color: Colorless to Dark Brown	Solubility: Water, brine
Odor: Glycol	Wt. per Gal.: 8.5 lbs.
Charge: NA	Flash Point: None

### Application

LEB-4 should be added continuously on the fly to prevent premature gel breaks. The desired amount of LEB-4 should be diluted with water to a volume which can be metered easily. Recommended use rate is 1-2 fluid ounces/Mgal. in linear gels and 3-4 fluid ounces/Mgal. in cross-linked gels. LEB-4 has a pH optimum range of 3.5 to 4.5 at 104° F. Effective activity is demonstrated over the range of pH 3.5 to 6.0. Values below 3.5 and above pH 8.0 rapidly deactivate these enzymes. LEB-4 has a temperature optimum of 122° to 140° F at pH 4.5. Temperatures above 140° rapidly deactivate the enzyme. Temperatures below 122° at pH 4.5 result in extended stability.

### Compatibility

LEB-4 must not be blended with any other additives (except water) prior to use.

### Handling/Storage

LEB-4 should be stored in a cool, dark location. Shelf-life is typically 12 months (1 year). Heat and/or exposure to air over time will influence the performance of LEB-4. Keep all containers tightly closed. LEB-4 is non-toxic and virtually harmless. It may be irritating if contacted with the eyes. It may irritate the skin of extremely sensitive individuals. Chemical splash goggles and cloth or rubber gloves are recommended when handling LEB-4. Refer to Material Safety Data Sheet (MSDS) for handling and hazard data.

### Packaging

LEB-4 is packaged in 1 gal. plastic jugs, 4 gals. per case, 4 jugs per case.