

VORNIA BIOMATERIALS

## Certificate of Analysis for Thiol-Modified Hyaluronic Acid

PRODUCT CODE: HA-SH010

LOT NUMBER: HASH-H01/16

EXPIRY DATE: 06/2017

### Quality Control Analysis

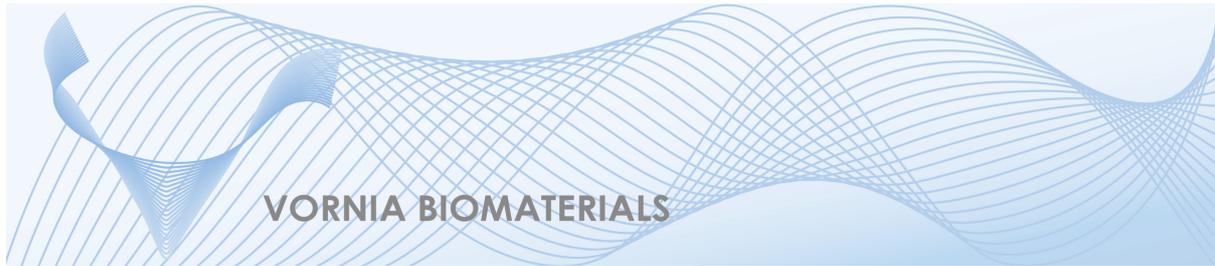
Characteristic	Specification	Result
Degree of substitution for thiolated HA [%]	>60%	69.7%
Free Thiol Fraction [%]	>60%	60.1%
Thiol content [mmol/g]	1.2-1.4 mmol/g	1.20 mmol/g
Purity [%]	>95%	98%
pH after rehydration in PBS	Neutral (6.5-7.5)	6.5
Appearance	White foam / powder	White foam
Water solubilisation time [min]	Should dissolve within 30 minutes	20 min under vortex

**NOTE:** This product is packaged in 2 mL clear glass vials under argon. Do not expose to air until use as crosslinking will begin spontaneously.

Name: Sigen A

Signature:

Date: 06.06.2016



## Instructions for Use

### Fast-gelling Thiol-modified Hyaluronic Acid

#### Overview

Vornia Fast-Gelling Thiolated Hyaluronic Acid is a natural glycosaminoglycan and component of extracellular matrix (ECM) making it particularly suited to cell culture, cosmetic and medical device applications. It may be used in conjunction with ECM proteins such as collagen, laminin, or fibronectin for most 3D cell culture and tissue-engineering applications.

The procedure for thiolating our Hyaluronic Acid product was developed in collaboration with leading scientists in University College Dublin, Ireland, in response to customer requests for thiolated hyaluronic acid suitable for tissue engineering applications, especially for the production of hydrogels in the investigation of wound healing. Vornia's thiolated hyaluronic acid has >98% purity and has a very short gelation time with multi-vinyl cross-linkers (<30 min). All batches of thiol-modified hyaluronic acid are provided with full certificate of analysis.

#### Product Description

Vornia Fast-Gelling Hyaluronic Acid is supplied as a salt-free lyophilized solid. It is provided at a mass of 10 mg in 1 mL vials with rubber insert caps for convenient re-constitution with minimal exposure to air. Our Hyaluronic acid is packaged under inert argon gas

#### Storage Instructions

Vornia Fast-Gelling Hyaluronic Acid should be stored in its original vial at  $\leq -15^{\circ}\text{C}$  and used within one year of its production date.

Our thiolated Hyaluronic Acid product is provided non-sterile, therefore, for aseptic applications we

recommend passing reconstituted Hyaluronic Acid through a  $0.22\ \mu\text{m}$  filter prior to use.

#### Instructions for Use

Thiolated Hyaluronic Acid will crosslink in the presence of oxygen and therefore should be re-constituted in degassed, deionized water (sterile, if using in cell culture). Our vial caps are designed to allow for the insertion of a needle through the rubber insert for the purposes of re-constitution without opening the vial and exposing the product to oxygen in the air.

- I. To relieve pressure inside the vial, pierce the rubber insert with a fine-tipped needle and, using a syringe, extract a 4mL volume of the inert gas which blankets the product.
- II. Resuspend in 1 mL of degassed 1X PBS\*, using a needle and syringe, to achieve a stock concentration of 10mg/mL (observe aseptic technique if intended for cell culture).
- III. To dissolve, we recommend unopened vials to be set to shake at 600 rpm, or greater, (or vortex) for <20 min (pH needs to be adjusted to neutral after fully dissolution).
- IV. For gelation of Vornia Thiol-modified Hyaluronic Acid, we recommend the addition of crosslinking multivinyl polymer (e.g. PEGDA) in 1:4 ratio and incubation at  $37^{\circ}\text{C}$ . Gelation occurs between 10 min to 30 min, depending on % w/v of crosslinker.

\*If re-constituting in degassed water, neutralisation of solution pH will be necessary. (1 mL of  $\text{H}_2\text{O}$  + 8  $\mu\text{L}$  1M NaOH per vial)