

## QuantiChrom™ Sialic Acid Assay Kit (Cat# DSLA-100)

### Quantitative Determination of Free and Total Sialic Acid

#### DESCRIPTION

**SIALIC ACID** is a general name for nine carbon acidic sugars with N- or O-substituted derivatives. The most common member of these sugars is N-acetylneuraminic acid (NANA). Sialic acid is widely distributed throughout mammalian tissues and fluids including serum. Sialylated oligosaccharides have been shown to exhibit antiviral properties and are also known to influence blood coagulation and cholesterol levels. The sialic acid level in body fluids is also an important marker for diagnosing cancer. Simple and direct procedures for measuring sialic acid concentrations find wide applications in research and drug discovery. BioAssay Systems' sialic acid assay uses an improved Warren method, in which sialic acid is oxidized to formylpyruvic acid which reacts with thiobarbituric acid to form a pink colored product. The color intensity at 549 nm or fluorescence intensity at  $\lambda_{em/ex} = 585/555$  nm is directly proportional to sialic acid concentration in the sample.

#### KEY FEATURES

**Sensitive and accurate.** Use as little as 60  $\mu$ L samples. Linear detection range in 96-well plate: 5 to 1000  $\mu$ M sialic acid for colorimetric assays and 0.5 to 100  $\mu$ M for fluorimetric assays.

#### APPLICATIONS

**Direct Assays:** sialic acid in biological samples (e.g. serum, plasma, saliva, milk).

#### KIT CONTENTS

**Dye Reagent:** 6 mL      **Oxidation Reagent:** 10 mL  
**10% TCA:** 5 mL      **Hydrolysis Reagent:** 10 mL  
**DMSO:** 12 mL      **Standard:** 500  $\mu$ L 10 mM Sialic Acid

**Storage conditions.** The kit is shipped at ambient temperature. Store the Standard at  $-20^{\circ}\text{C}$ , all others at room temperature. Shelf life of twenty four months after receipt.

**Precautions:** reagents are for research use only. Normal precautions for laboratory reagents should be exercised while using the reagents. Please refer to Material Safety Data Sheet for detailed information.

#### COLORIMETRIC PROCEDURE

1. **Standards.** Equilibrate all components to room temperature. Prepare a 1000  $\mu$ M sialic acid standard Premix by mixing 25  $\mu$ L of the 10 mM Standard and 225  $\mu$ L distilled water  $\text{dH}_2\text{O}$ . Dilute Standard as follows.

No	Premix + $\text{dH}_2\text{O}$	Vol ( $\mu$ L)	Sialic Acid ( $\mu$ M)
1	100 $\mu$ L + 0 $\mu$ L	100	1000
2	60 $\mu$ L + 40 $\mu$ L	100	600
3	30 $\mu$ L + 70 $\mu$ L	100	300
4	0 $\mu$ L + 100 $\mu$ L	100	0

Transfer 20  $\mu$ L standards into four labeled Eppendorf tubes, add 5  $\mu$ L 10% TCA.

2. **Samples treatment.** To determine total sialic acid (TSA), samples need to be hydrolyzed to release bound sialic acid as follows. In an Eppendorf tube, mix 20  $\mu$ L sample, 40  $\mu$ L  $\text{dH}_2\text{O}$  and 40  $\mu$ L Hydrolysis Reagent. Heat at  $80^{\circ}\text{C}$  for 60 min, let cool and briefly centrifuge. Add 25  $\mu$ L 10% TCA, vortex and centrifuge at 14,000 rpm for 10 min. Transfer 25  $\mu$ L supernatant into a clean tube and label it "TSA".

To determine free sialic acid (FSA), directly precipitate protein by mixing 40  $\mu$ L sample and 10  $\mu$ L 10% TCA. Vortex and centrifuge at 14,000 rpm for 10 min. Transfer 25  $\mu$ L supernatant into a clean tube and label it "FSA".

3. **Oxidation.** Prepare working reagent for each tube by mixing 15  $\mu$ L Hydrolysis Reagent, 50  $\mu$ L  $\text{dH}_2\text{O}$  and 65  $\mu$ L Oxidation Reagent. Add 125  $\mu$ L working reagent to each tube and let stand for 60 min at room temperature.

4. **Color Reaction.** Add 50  $\mu$ L Dye Reagent to each tube. Mix and heat for 10 min at  $100^{\circ}\text{C}$ . Let cool for another 5-10 min. Add 100  $\mu$ L DMSO to each tube. Mix and centrifuge for 5 min at 14,000 rpm. Transfer 250  $\mu$ L supernatant into separate wells of a clear, flat-bottom 96-well plate.

5. Read optical density at 549 nm (540-555nm).

#### FLUORIMETRIC PROCEDURE

The fluorimetric assay is 10-fold more sensitive than the colorimetric assay. Prepare standards at 0, 30, 60 and 100  $\mu$ M sialic acid in  $\text{dH}_2\text{O}$ .

The sample treatment, oxidation and color reaction steps are the same, except that the final reaction mixture is transferred into wells of a black, flat-bottom 96-well plate. Read fluorescence intensity at  $\lambda_{ex} = 555$  nm and  $\lambda_{em} = 585$  nm.

#### CALCULATION

Subtract blank value (#4) from the standard values and plot the  $\Delta\text{OD}$  or  $\Delta\text{F}$  against standard concentrations. Determine the slope and calculate the sialic acid concentration of Sample,

$$[\text{Sialic acid}] = \frac{R_{\text{SAMPLE}} - R_{\text{BLANK}}}{\text{Slope } (\mu\text{M}^{-1})} \times n \quad (\mu\text{M})$$

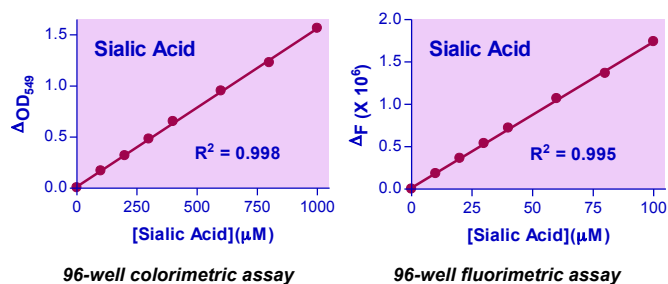
$R_{\text{SAMPLE}}$  and  $R_{\text{BLANK}}$  are optical density or fluorescence intensity readings of the Sample and  $\text{dH}_2\text{O}$  Blank (#4), respectively.  $n$  is the sample dilution factor,  $n = 5$  for TSA assays and  $n = 1$  for FSA assays.

**Note:** if the Sample OD value is higher than that for the 1000  $\mu$ M Standard, or sample fluorescence intensity higher than that for the 100  $\mu$ M Standard, dilute sample in water and repeat the assay. Multiply result by the fold of dilution.

**Conversions:** 1000  $\mu$ M NANA equals 30.9 mg/dL or 309 ppm.

#### MATERIALS REQUIRED, BUT NOT PROVIDED

Pipeting devices, centrifuge tubes, centrifuge, heat block, clear flat-bottom 96-well plates, black 96-well plates (e.g. Corning Costar) and plate readers.



#### LITERATURE

- Warren, L. (1959). The Thiobarbituric Acid Assay of Sialic Acids J. Biol. Chem. 234: 1971-1975.
- Stefenelli, N. et al (1985). Serum sialic acid in malignant tumors, bacterial infections, and chronic liver diseases. J Cancer Res Clin Oncol. 109(1):55-59.
- Sherblom, A.P. et al (1988). Bovine serum sialic acid: age-related changes in type and content. Int J Biochem. 20:1177-1183.