

# $\beta$ -N-Acetylglucosaminidase (NAG) Assay Kit (Colorimetric)

LS-K253-100 (100 Tests) • See Storage Conditions Below



## Introduction

$\beta$ -N-Acetylglucosaminidase (NAG) is a lysosomal enzyme involved in a variety of biological processes such as the degradation of glycoproteins and glycolipids, cell proliferation, and signal transduction. NAG is found in many tissues in the body, but due to its high molecular weight, it cannot be filtered through the glomerular membrane. For this reason, in the presence of tubular damage or a glomerular lesion, urinary NAG activity increases. Elevated NAG levels in urine are an early indication of renal damage, such as injury due to diabetes mellitus, inflammation, nephritic syndrome, urinary tract infection, and more. Various forms of cancer have been associated with increased levels of NAG in serum. Genetically inherited lipid storage disorders, such as Tay-Sachs and Sandhoff disease, arise from deficiencies of the enzyme. This non-radioactive, colorimetric NAG assay is based on the cleavage of *p*-nitrophenol from a synthetic substrate. *p*-Nitrophenol becomes intensely colored after addition of the stop reagent. The increase in absorbance at 405 nm after addition of the stop reagent is directly proportional to the enzyme activity.

## Key Features

- Fast and sensitive. Linear detection range (20  $\mu$ L sample): 0.2 to 50 U/L for a 30 minute reaction at 37°C.
- High-throughput. Homogeneous "mix-incubate-measure" type assay. Can be readily automated on HTS liquid handling systems for processing thousands of samples per day.

## Applications

- $\beta$ -N-Acetylglucosaminidase activity determination in biological samples (e.g. urine, serum, plasma, cell lysate, etc.)

## Components

Component	K253-100
	100 Tests
Substrate	10 mL
Stop Reagent	12 mL
Standard (12.5mM Nitrophenol)	1 mL

## Materials Not Supplied

Pipetting devices and accessories (e.g. multi-channel pipettor), clear flat-bottom 96-well plates (e.g. VWR cat# 82050-760), centrifuge tubes, and plate reader.

## Storage

The kit is shipped at room temperature. Store the substrate at -20°C and all other components at 4°C upon receiving. Shelf life: 12 months after receipt.

**FOR RESEARCH USE ONLY! Not for use in humans.**

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## Assay Procedure

This assay is based on a kinetic reaction. To ensure identical incubation time, addition of Substrate and Stop Reagent to samples should be quick, and mixing should be brief but thorough. Use of a multi-channel pipettor is recommended.

### Sample Preparation

Serum and plasma can be assayed directly. For urine samples containing precipitation, centrifuge at 10,000 x g, 4°C for 3 minutes and assay the supernatant.

Cell Lysate: Collect cells by centrifugation at 2,000 x g for 5 min at 4°C. For adherent cells, do not harvest cells using proteolytic enzymes; rather use a rubber policeman. Homogenize or sonicate cells in an appropriate volume of cold PBS, approximately one million cells per mL. Centrifuge at 14,000 x g for 10 min at 4°C. Remove supernatant for assay.

### Reagent Preparation

Equilibrate all components to 37°C. Briefly vortex or pipette up and down all components to ensure fresh reconstitution.

### Standard Preparation

Mix 15  $\mu$ L of 12.5 mM Nitrophenol standard with 235  $\mu$ L dH<sub>2</sub>O to make 750  $\mu$ M Premix.

No	Premix + dH <sub>2</sub> O	Vol ( $\mu$ L)	Nitrophenol ( $\mu$ M)
1	100 $\mu$ L + 0 $\mu$ L	100	750
2	60 $\mu$ L + 40 $\mu$ L	100	450
3	30 $\mu$ L + 70 $\mu$ L	100	225
4	0 $\mu$ L + 100 $\mu$ L	100	0

## Procedure

1. Transfer 20  $\mu$ L of each sample into two separate wells (OD<sub>SAMPLE</sub> and OD<sub>SAMPLE BLANK</sub>). Transfer 20  $\mu$ L of each standard (OD<sub>STD</sub>) into separate wells of a clear flat bottom 96-well plate.
2. Add 100  $\mu$ L of stop reagent to the Sample Blank wells.
3. Add 80  $\mu$ L of the substrate solution to all standard, sample, and sample blank wells. Tap plate briefly to mix.
4. Incubate at 37°C or desired temperature for 30 minutes. Add 100  $\mu$ L of Stop Reagent to each standard and sample well. Note: Do not add anything more to the sample blank wells. Tap plate briefly to mix.
5. Read OD<sub>405nm</sub>.

## Calculations

Subtract blank OD (water, #4) from the standard OD values and plot the  $\Delta$ OD against standard concentrations. Determine the Slope and use the following equation to calculate  $\beta$ -N-Acetylglucosaminidase activity:

$$\text{NAG Activity} = \frac{\text{OD}_{\text{SAMPLE}} - \text{OD}_{\text{SAMPLE BLANK}}}{t \cdot \text{Slope}} \times n \quad (\text{U/L})$$

where OD<sub>SAMPLE</sub> is the OD<sub>405nm</sub> value for each sample and OD<sub>SAMPLE BLANK</sub> is the OD<sub>405nm</sub> value of the sample blank. Slope is the slope of the linear regression fit of the standard points and  $t$  is the reaction time (30 min).  $n$  is the dilution factor.

Unit definition: 1 Unit (U) will catalyze the conversion of 1  $\mu$ mole of p-Nitrophenyl N-acetyl- $\beta$ -D-glucosaminide to p-Nitrophenol and N-acetyl-D-glucosamine per min at 37°C, pH 4.5.

Note: If sample NAG activity exceeds 50 U/L, either use a shorter reaction time or dilute samples in water and repeat the assay. For samples with NAG activity < 1 U/L, the incubation time can be extended up to 4 hours for greater sensitivity.

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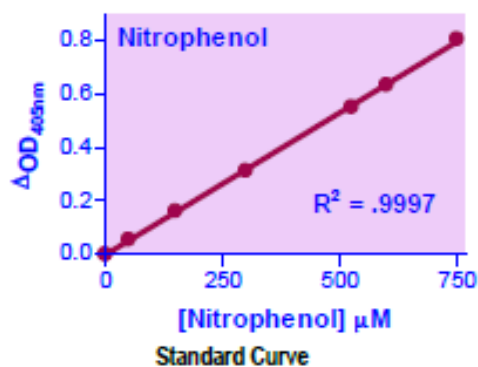
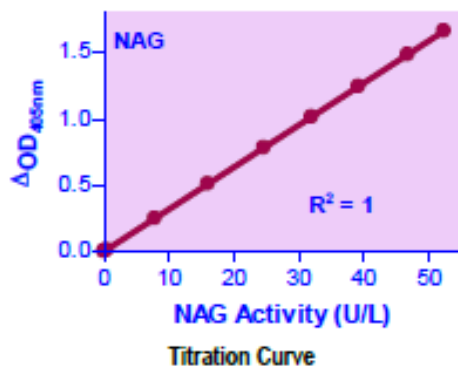
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## Sample Data



Version: V.08.09.2018

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