

Soil Catalase (S-CAT) Activity Assay Kit

Note: It is necessary to predict 2-3 large difference samples before the formal determination.

Operation Equipment: Microplate reader/ Spectrophotometer

Catalog Number: BC0105

Size:100T/48S

Product Composition: Before use, please carefully check whether the volume of the reagent is consistent with the volume in the bottle. If you have any questions, please contact Solarbio staff in time.

Reagent name	Size	Preservation Condition
Reagent I	Liquid 0.3 mL×1	2-8°C
Reagent II	Powder ×1	2-8°C
Reagent III	Liquid 3 mL×1	2-8°C

Solution Preparation:

1. Reagent I: The liquid is placed in an EP tube inside the bottle and needs to be centrifuged before use. Before use, take 0.05 mL of Reagent I and add 9.95 mL of distilled water to dilute it for use or prepare it in proportion. The left reagent can be stored at 2-8°C for one week.
2. Reagent II: Add 1 mL of distilled water before using to dissolve it. The left reagent can be stored at 2-8°C for four weeks.

Product Description

Soil catalase(S-CAT) is an important enzyme of soil microbial metabolism, which plays an important role in the removal system of H₂O₂.

Since the absorbance at 240 nm is proportional to the amount of H₂O₂, the activity of S-CAT can be quantified by measuring the decrease in the absorbance of the reaction solution at 240 nm.

Reagents and Equipment Required but Not Provided.

Spectrophotometer/microplate reader, table centrifuge, water-bath, micro quartz cuvette/96 well UV flat-bottom plate, transferpettor, mortar, 30-50 mesh sieve and distilled water.

Procedure

I. Sample processing:

Fresh soil samples are naturally air-dried or oven to dry at 37°C, then sieved by 30-50 mesh sieve.

II. Determination procedure:

1. Preheat spectrophotometer/microplate reader for 30 minutes, adjust the wavelength to 240 nm, set spectrophotometer to zero with distilled water.
2. Add reagents with the following list:

Reagent	Test Tube (T)	No Substrate Tube (NSu)	No Soil Tube (NSo)
Air-dried soil sample (g)	0.03	0.03	-

Reagent I (μL)	260	-	260
Double distilled water (μL)	-	260	-
shake and culture at 25°C for 20 minutes.			
Reagent II (μL)	10	10	10
Mix thoroughly, centrifuge at 8000 ×g for 5 minutes at 25°C and take all the supernatant.			
Reagent III (μL)	30	30	30

Mix thoroughly, take 200μL solution into a micro quartz cuvette/96 well UV plate and detect the absorbance of each tube at 240 nm and noted as A_T , A_{NSU} , and A_{NSO} . Each test tube should be provided with a no substrate tube, and the no soil tube only need test once or twice.

III. Calculation

A. micro cuvette

Unit definition: One unit of enzyme activity is defined as the amount of enzyme catalyzes the degradation of 1 mmol of H_2O_2 in the reaction system per day every gram of dry soil sample.

$$S\text{-CAT activity (U/g weight)} = [(A_{NSO} - A_T + A_{NSU}) \times V_{ra} \div (\epsilon \times d) \times 10^3] \div W \div T = 16.5 \times (A_{NSO} - A_T + A_{NSU})$$

V_{ra} : Total volume of the reaction system, 3×10^{-4} L;

ϵ : Molar extinction coefficient of hydrogen peroxide, 43.6 L/mol/cm;

D : Cuvette aperture, 1 cm;

T : Reaction time, 20 minutes = 1/72 day;

W : Sample mass, 0.03 g.

B. 96 well UV plate

Unit definition: One unit of enzyme activity is defined as the amount of enzyme catalyzes the degradation of 1 mmol of H_2O_2 in the reaction system per day every gram of dry soil sample.

$$S\text{-CAT activity (U/g weight)} = [(A_{NSO} - A_T + A_{NSU}) \times V_{ra} \div (\epsilon \times d) \times 10^3] \div W \div T = 27.5 \times (A_{NSO} - A_T + A_{NSU})$$

V_{ra} : Total volume of the reaction system, 3×10^{-4} L;

ϵ : Molar extinction coefficient of hydrogen peroxide, 43.6 L/mol/cm;

d : Cuvette aperture, 0.6 cm;

T : Reaction time, 20 minutes = 1/72 day;

W : Sample mass, 0.03 g.

Note:

If the absorbed supernatant is still partly turbid, centrifuge it again after adding Reagent III.

Recent Product citations:

[1] Liu T, Wang S, Chen Y, Luo J, Hao B, Zhang Z, Yang B, Guo W. Bio-organic fertilizer promoted phytoremediation using native plant *leymus chinensis* in heavy Metal(loid)s contaminated saline soil. *Environ Pollut.* 2023 Jun 15; 327:121599. doi: 10.1016/j.envpol.2023.121599. Epub 2023 Apr 8.

[2] Zhuang X, Wang Y, Wang H, Dong Y, Li X, Wang S, Fan H, Wu S. Comparison of the efficiency and microbial mechanisms of chemical- and bio-surfactants in remediation of petroleum hydrocarbon. *Environ Pollut.* 2022 Dec 1; 314:120198. doi: 10.1016/j.envpol.2022.120198. Epub 2022 Sep 19.

[3] Zheng S, Liao Y, Xu C, Wang Y, Zhang Q, Zhu Q, Zhu H, Sun Y, Zhou Y, Zhong D, Huang D. Milk vetch returning reduces rice grain Cd concentration in paddy fields: Roles of iron plaque and soil reducing-bacteria. *Chemosphere.* 2022 Dec;308(Pt 1):136158. doi: 10.1016/j.chemosphere.2022.136158. Epub 2022 Aug 24. PMID: 36029857.

[4] Chen X, Li Y, Jiang L, Jiang X, Hu B, Wang L, Zhang S, Zhang X. Uptake and transport of steroid estrogens in soil-plant systems and their dissipation in rhizosphere: Influence factors and mechanisms. *J Hazard Mater.* 2022 Apr 15; 428:128171. doi: 10.1016/j.jhazmat.2021.128171. Epub 2022 Jan 3. PMID: 35016124.

[5] Muhammad I, Yang L, Ahmad S, Zeeshan M, Farooq S, Ali I, Khan A, Zhou XB. Irrigation and Nitrogen Fertilization Alter Soil Bacterial Communities, Soil Enzyme Activities, and Nutrient Availability in Maize Crop. *Front Microbiol.* 2022 Feb 3; 13:833758. doi: 10.3389/fmicb.2022.833758. PMID: 35185852; PMCID: PMC8851207.

References:

[1] Yang L F, Zeng Q, Li H B, et al. Measurement of Catalase Activity in Soil by Ultraviolet Spectrophotometry[J]. *Chinese Journal of Soil Science*, 2011, 42(1):207-210.

[2] Johansson L H, Borg L A H. A spectrophotometric method for determination of catalase activity in small tissue samples[J]. *Analytical biochemistry*, 1988, 174(1): 331-336.

Related Products:

BC0280/BC0285	Soil Alkaline Phosphatase (S-AKP/ALP) Activity Assay Kit
BC0110/BC0115	Soil polyphenol oxidase (S-PPO) Activity Assay Kit
BC0120/BC0125	Soil Urease (S-UE) Activity Assay Kit
BC0140/BC0145	Soil Acid Phosphatase (S-ACP) Activity Assay Kit