

(FOR RESEARCH USE ONLY. DO NOT USE IT IN CLINICAL DIAGNOSIS !)

**Catalog No: E-BC-K554-M**

**Specification: 96T(80 samples)**

**Measuring instrument: Microplate reader(440-460 nm)**

**Detection range: 0.10-50.47 U/L**

## **Elabscience® NADP-Isocitrate Dehydrogenase (NADP-IDH) Activity Assay Kit**

This manual must be read attentively and completely before using this product.

If you have any problem, please contact our Technical Service Center for help:

Toll-free: 1-888-852-8623

Tell: 1-832-243-6086

Fax: 1-832-243-6017

Email: [techsupport@elabscience.com](mailto:techsupport@elabscience.com)

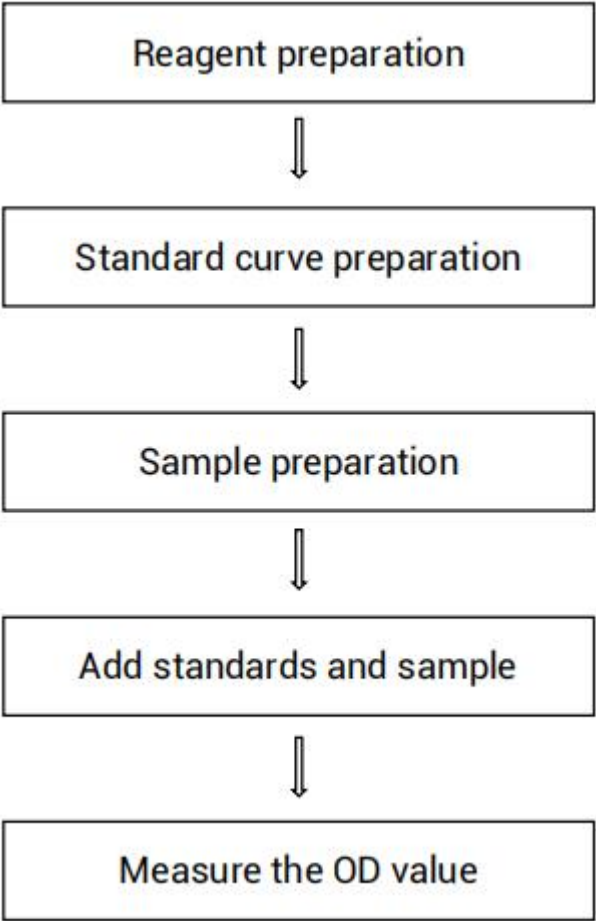
Website: [www.elabscience.com](http://www.elabscience.com)

Please kindly provide us the lot number (on the outside of the box) of the kit for more efficient service.

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**Assay summary**



## **Intended use**

This kit can be used to measure NADP-isocitrate dehydrogenase (NADP-IDH) activity in tissue and cell samples.

## **Detection principle**

Isocitrate dehydrogenase (IDH) is one of the invertase in the tricarboxylic acid cycle, which plays an important role in energy metabolism and amino acid and vitamin synthesis. The cofactors of IDH include two types of  $\text{NAD}^+$  and  $\text{NADP}^+$ , located in different parts of the cell. In eukaryotic cells,  $\text{NADP}^+$  dependent isocitrate dehydrogenase is mainly present in the cytoplasm.

Isocitrate dehydrogenase converts isocitrate to  $\alpha$ -ketoglutaric acid, while converting  $\text{NADP}^+$  to NADPH. Under the action of electron coupling agents, the generated NADPH has a characteristic absorption peak at 450 nm. The activity of NADP-IDH can be calculated by measuring the change of absorbance value at 450 nm.

## Kit components & storage

Item	Component	Size (96 T)	Storage
Reagent 1	Buffer Solution	50 mL × 2 vials	-20°C, 12 months, shading light
Reagent 2	Substrate	1.5 mL × 1 vial	-20°C, 12 months, shading light
Reagent 3	Accelerant	1.5 mL × 1 vial	-20°C, 12 months, shading light
Reagent 4	Chromogenic Agent	2.5 mL × 1 vial	-20°C, 12 months, shading light
Reagent 5	10 mmol/L Standard	0.5 mL × 1 vial	-20°C, 12 months, shading light
	Microplate	96 wells	No requirement
	Plate Sealer	2 pieces	
	Sample Layout Sheet	1 piece	

Note: The reagents must be stored strictly according to the preservation conditions in the above table. The reagents in different kits cannot be mixed with each other. For a small volume of reagents, please centrifuge before use, so as not to obtain sufficient amount of reagents.

## Materials prepared by users

### Instruments:

Microplate reader (440-460 nm, optimum wavelength: 450nm), 37°C

Incubator

### Reagents:

Double distilled water

## Reagent preparation

① Equilibrate all reagents to room temperature before use.

② Preparation of reaction working solution:

For each well, prepare 120  $\mu\text{L}$  of reaction working solution (mix well 102  $\mu\text{L}$  of buffer solution, 9  $\mu\text{L}$  of substrate and 9  $\mu\text{L}$  of accelerant).

Keep reaction working solution on ice protected from light during use.

The prepared solution should be used up within 1 day.

③ Preparation of 0.5 mmol/L standard solution:

Dilute 50  $\mu\text{L}$  of 10 mmol/L standard with 950  $\mu\text{L}$  of double distilled water, mix well to dissolve. Keep 0.5 mmol/L standard solution on ice protected from light during use. The prepared solution should be used up within 8 hours.

④ The preparation of standard curve:

Always prepare a fresh set of standards. Discard working standard dilutions after use.

Dilute 0.5 mmol/L standard solution with double distilled water to a serial concentration. The recommended dilution gradient is as follows: 0, 0.1, 0.15, 0.2, 0.3, 0.35, 0.4, 0.5 mmol/L. Reference is as follows:

Item	①	②	③	④	⑤	⑥	⑦	⑧
<b>Concentration (mmol/L)</b>	<b>0</b>	<b>0.1</b>	<b>0.15</b>	<b>0.2</b>	<b>0.3</b>	<b>0.35</b>	<b>0.4</b>	<b>0.5</b>
<b>0.5 mmol/L standard (<math>\mu\text{L}</math>)</b>	0	40	60	80	120	140	160	200
<b>Double distilled water (<math>\mu\text{L}</math>)</b>	200	160	140	120	80	60	40	0

## **Sample preparation**

### **① Sample preparation**

#### **Tissue sample:**

- ① Harvest the amount of tissue needed for each assay (initial recommendation 20 mg).
- ② Wash tissue in cold PBS (0.01 M, pH 7.4).
- ③ Homogenize 20 mg tissue in 180  $\mu$ L buffer solution with a dounce homogenizer at 4°C.
- ④ Centrifuge at 10000 $\times$ g for 10 min at 4°C to remove insoluble material. Collect supernatant and keep it on ice for detection.
- ⑤ Meanwhile, determine the protein concentration of supernatant (E-BC-K318-M).

#### **Cell (adherent or suspension) samples:**

- ① Harvest the number of cells needed for each assay (initial recommendation 1 $\times$ 10<sup>6</sup> cells).
- ② Wash cells with PBS (0.01 M, pH 7.4).
- ③ Homogenize 1 $\times$ 10<sup>6</sup> cells in 200  $\mu$ L buffer solution with a ultrasonic cell disruptor at 4°C.
- ④ Centrifuge at 10000 $\times$ g for 10 min at 4°C to remove insoluble material. Collect supernatant and keep it on ice for detection.
- ⑤ Meanwhile, determine the protein concentration of supernatant (E-BC-K318-M).

## ② Dilution of sample

The recommended dilution factor for different samples is as follows (for reference only):

Sample type	Dilution factor
10% Rat kidney tissue homogenate	10-60
10% Rat brain tissue homogenate	5-10
10% Rat liver tissue homogenate	10-80
$1 \times 10^6$ CHO cells	1
$1 \times 10^6$ RAW cells	1
$1 \times 10^6$ 293T cells	1

Note: The diluent is buffer solution. For the dilution of other sample types, please do pretest to confirm the dilution factor.

## The key points of the assay

Keep sample on ice during use.



## Operating steps

- ① Standard well: add 20  $\mu\text{L}$  of standards with different concentrations into the standard wells.  
Sample well: add 20  $\mu\text{L}$  of sample into the sample wells.
- ② Add 120  $\mu\text{L}$  of reaction working solution to each well.
- ③ Add 20  $\mu\text{L}$  of chromogenic agent to each well.
- ④ Mix well for 3 s with microplate reader. Incubate at 37  $^{\circ}\text{C}$  for 5 min protected from light.
- ⑤ Measure the OD value ( $A_1$ ) of each well at 450 nm with microplate reader, then incubate at 37  $^{\circ}\text{C}$  for 20 min protected from light and measure the OD value ( $A_2$ ) of each well at 450 nm.  $\Delta A_{\text{sample}} = A_2 - A_1$ ,  $\Delta A_{450} = \Delta A_{\text{sample}} - \Delta A_{\text{blank}}$  ( $\Delta A_{\text{blank}}$  is the  $\Delta A$  when the standard concentration is 0,  $\Delta A_{\text{blank}} = A_2 - A_1$ ).  
(Note: Standard wells only need to measure the OD values of  $A_2$ .)

## Calculation

### The standard curve:

1. Average the duplicate reading for each standard.
2. Subtract the mean OD value of the blank (Standard # ① ) from all standard readings. This is the absolved OD value.
3. Plot the standard curve by using absolved OD value of standard and correspondent concentration as y-axis and x-axis respectively. Create the standard curve ( $y = ax + b$ ) with graph software (or EXCEL).

### The sample:

#### NADP-IDH activity in tissue and cell sample:

**Definition:** The amount of NADP-IDH in 1 g tissue or cell protein that catalyze the substrate to produce 1  $\mu\text{mol}$  NADPH in 1 minute at 37°C is defined as 1 unit.

$$\text{NADP-IDH activity (U/gprot)} = (\Delta A_{450} - b) \div a \div T \times 1000 \div C_{pr} \times f$$

#### [Note]

$\Delta A_{450}$ :  $\Delta A_{450} = \Delta A_{\text{sample}} - \Delta A_{\text{blank}}$ , ( $\Delta A_{\text{sample}} = A_2 - A_1$ ,  $\Delta A_{\text{Blank}}$  is the  $\Delta A$  when the standard concentration is 0).

T: The reaction time, 20 min.

1000: 1 mmol/L = 1000  $\mu\text{mol/L}$ .

f: Dilution factor of sample before tested.

$C_{pr}$ : The concentration of protein in sample, gprot/L.

## Appendix I Performance Characteristics

### 1. Parameter:

#### Intra-assay Precision

Three mouse lung samples were assayed in replicates of 20 to determine precision within an assay. (CV = Coefficient of Variation)

Parameters	Sample 1	Sample 2	Sample 3
Mean (U/L)	0.88	1.49	2.26
%CV	5.00	6.00	6.00

#### Inter-assay Precision

Three mouse lung samples were assayed 20 times in duplicate by three operators to determine precision between assays.

Parameters	Sample 1	Sample 2	Sample 3
Mean(U/L)	0.39	1.37	1.78
%CV	5.70	6.30	7.20

#### Recovery

Take three samples of high concentration, middle concentration and low concentration to test the samples of each concentration for 6 times parallelly to get the average recovery rate of 103%.

	Standard 1	Standard 2	Standard 3
Expected Conc. (U/L)	0.90	1.50	2.10
Observed Conc. (U/L)	0.88	1.49	2.26
Recovery rate (%)	97.00	100.00	111.00

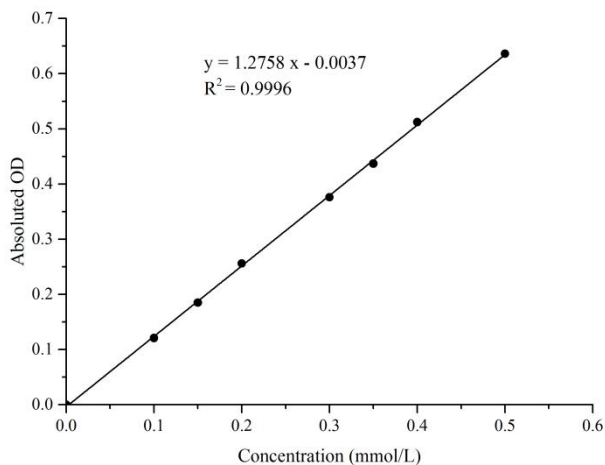
#### Sensitivity

The analytical sensitivity of the assay is 0.1 U/L. This was determined by adding two standard deviations to the mean O.D. obtained when the zero standard was assayed 20 times, and calculating the corresponding concentration.

## 2. Standard curve:

As the OD value of the standard curve may vary according to the conditions of the actual assay performance (e.g. operator, pipetting technique or temperature effects), so the standard curve and data are provided as below for reference only:

Concentration (mmol/L)	0	0.1	0.15	0.2	0.3	0.35	0.4	0.5
OD value	0.056	0.172	0.235	0.310	0.432	0.486	0.563	0.691
	0.047	0.173	0.237	0.305	0.423	0.491	0.564	0.683
Average OD	0.052	0.173	0.236	0.308	0.428	0.489	0.564	0.687
Absoluted OD	0	0.121	0.185	0.256	0.376	0.437	0.512	0.636



## Appendix Π Example Analysis

### Example analysis :

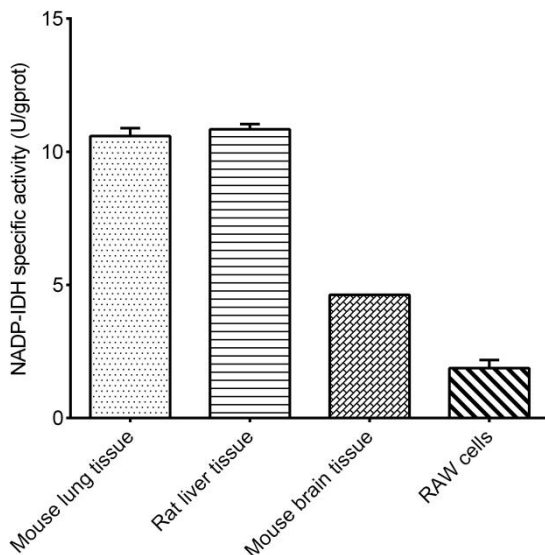
For 10% mouse lung tissue homogenate, take 20  $\mu\text{L}$  and carry the assay according to the operation table. The results are as follows:

Standard curve:  $y = 1.2758x - 0.0037$ , The  $A_1$  of sample well is 0.391, the  $A_2$  of sample well is 0.624. The  $\Delta A$  of blank well is 0.005.  $\Delta A_{450} =$

$(0.624 - 0.391) - 0.005 = 0.228$ . The concentration of protein in sample is 8.77 gprot/L, and the calculation result is:

$$\text{NADP-IDH activity (U/gprot)} = (0.228 + 0.0037) \div 1.2758 \div 20 \times 1000 \div 8.77 \times 10 = 10.35 \text{ U/gprot}$$

Detect 10% mouse lung tissue homogenate (the concentration of protein is 8.77 gprot/L, dilute for 10 times), 10% rat liver tissue homogenate (the concentration of protein is 5.267 gprot/L, dilute for 10 times), 10% mouse brain tissue homogenate (the concentration of protein is 3.616 gprot/L, dilute for 10 times) and RAW cells (the concentration of protein is 0.182 gprot/L) according to the protocol, the result is as follows:



## Statement

1. This assay kit is for Research Use Only. We will not response for any arising problems or legal responsibilities causing by using the kit for clinical diagnosis or other purpose.
2. Please read the instructions carefully and adjust the instruments before the experiments. Please follow the instructions strictly during the experiments.
3. Protection methods must be taken by wearing lab coat and latex gloves.
4. If the concentration of substance is not within the detection range exactly, an extra dilution or concentration should be taken for the sample.
5. It is recommended to take a pre-test if your sample is not listed in the instruction book.
6. The experimental results are closely related to the situation of reagents, operations, environment and so on. Elabscience will guarantee the quality of the kits only, and NOT be responsible for the sample consumption caused by using the assay kits. It is better to calculate the possible usage of sample and reserve sufficient samples before use.



