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

Catalog No：E-BC-K139-S

Specification：50 Assays(46 samples)/100 Assay(96 samples)

Measuring instrument：Spectrophotometer（520 nm）

Detection range：0.072-60 mg/L

Elabscience® Iron Colorimetric 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
Website: 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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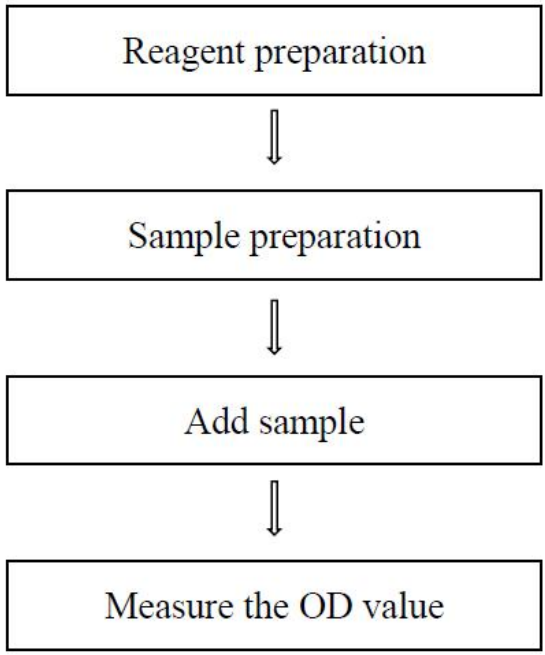
Assay summary



Intended use

This kit can be used to measure the concentration of iron in serum and tissue samples.

Detection principle

Under the action of acidic solution and reductant, ferric ions can be separated from transferrin in serum, and reduced into ferrous ions (Fe^{2+}). The latter then bind to bipyridine and form pink complexes. The concentration of iron can be calculated by measuring the OD value at 520 nm indirectly.

Kit components & storage

Item	Component	Size 1 (50 assays)	Size 2 (100 assays)	Storage
Reagent 1	100 mg/L Iron Standard	2 mL × 1 vial	2 mL × 1 vial	2-8°C, 12 months
Reagent 2	Chromogenic Agent A	Powder × 2 vials	Powder × 4 vials	2-8°C, 12 months, shading light
Reagent 3	Chromogenic Agent B	Powder × 2 vials	Powder × 4 vials	2-8°C, 12 months, shading light
Reagent 4	Chromogenic Agent C	50 mL × 2 vials	50 mL × 4 vials	2-8°C, 12 months

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:

Spectrophotometer (520 nm), Micropipettor, Vortex mixer, Incubator, Centrifuge

Reagent preparation

① Equilibrate all the reagents to room temperature before use.

② The preparation of 2 mg/L iron standard working solution：

For each well, prepare 500 μL of 2 mg/L iron standard working solution (mix well 10 μL of 100 mg/L iron standard and 490 μL of deionized water). Store at 2-8°C for 3 days.

③ The preparation of iron chromogenic agent：

Dissolve one vial of chromogenic agent A and one vial of chromogenic agent B with 50 mL of chromogenic agent C, mix well. Store at 2-8°C for 1 month protected from light.

Sample preparation

① Sample preparation:

Serum (plasma): detect directly. If not detected on the same day, the serum or plasma can be stored at -80°C for a month.

Tissue samples:

① Harvest the amount of tissue needed for each assay (initial recommendation 60 mg).

② Wash tissue in cold PBS (0.01 M, pH 7.4).

③ Homogenize 60 mg tissue in 540 μL normal saline (0.9% NaCl) with a dounce homogenizer at 4°C.

④ Centrifuge at 10000×g for 10 min 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
Human serum	1
Mouse serum	1
10% Mouse liver tissue homogenization	1
10% Rat kidney tissue homogenization	1

Note: The diluent is normal saline (0.9% NaCl) or PBS (0.01 M, pH 7.4). For the dilution of other sample types, please do pretest to confirm the dilution factor.

The key points of the assay

① It is recommended to use disposable consumables to avoid the contamination of iron.

② The supernatant after centrifugation must be clarified.

Operating steps

① Blank tube: Add 0.5 mL of deionized water into a 5 mL EP tube.
Standard tube: Add 0.5 mL of 2 mg/L iron standard working solution into a 5 mL EP tube.
Sample tube: Add 0.5 mL of sample into a 5 mL EP tube.

② Add 1.5 mL of iron chromogenic agent to each well, mix fully with a vortex mixer, then incubate in 100°C water bath for 5 min. (Blank tube and standard tube can be treated without 100°C water bath.)

③ Cool the tubes with running water, centrifuge the tubes at 2300 g for 10 min. (If the supernatant is still turbid, take the turbid supernatant into another centrifuge tube and centrifuge again.)

④ Take 1.0 mL of supernatant. Set the spectrophotometer to zero with deionized water, and measure the OD value of each tube with spectrophotometer at 520 nm with 0.5 cm optical path quartz cuvette.

Note: When taking the supernatant for colorimetry measurement, it is suggested to take the supernatant carefully with the pipette to avoid adding sediment to cuvette and affect the OD value.

Calculation

The sample:

1. Serum sample:

$$\text{Iron content (mg/L)} = \frac{\Delta A_1}{\Delta A_2} \times c_1 \times f$$

or

$$\text{Iron content (μmol/L)} = \frac{\Delta A_1}{\Delta A_2} \times c_2 \times f$$

2. Tissue sample:

$$\text{Iron content (mg/gprot)} = \frac{\Delta A_1}{\Delta A_2} \times c_1 \times f \div C_{pr}$$

or

$$\text{Iron content (μmol/gprot)} = \frac{\Delta A_1}{\Delta A_2} \times c_2 \times f \div C_{pr}$$

[Note]

ΔA_1: $OD_{Sample} - OD_{Blank}$

ΔA_2: $OD_{Standard} - OD_{Blank}$

c_1: The concentration of standard, 2 mg/L

c_2: The concentration of standard, 35.8 μmol/L

2 mg/L Iron standard = 2000 μg/L ÷ Molecular weight of Iron (55.847) = 35.8 μmol/L

f: Dilution factor of sample before test.

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

Appendix I Performance Characteristics

1. Parameter:

Intra-assay Precision

Three human serum 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 (mg/L)	0.55	16.50	46.20
%CV	2.6	2.6	2.3

Inter-assay Precision

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

Parameters	Sample 1	Sample 2	Sample 3
Mean (mg/L)	0.55	16.50	46.20
%CV	4.2	4.7	4.9

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 99%.

	Standard 1	Standard 2	Standard 3
Expected Conc. (mg/L)	10.5	27.5	50.4
Observed Conc. (mg/L)	10.4	27.8	48.9
Recovery rate (%)	99	101	97

Sensitivity

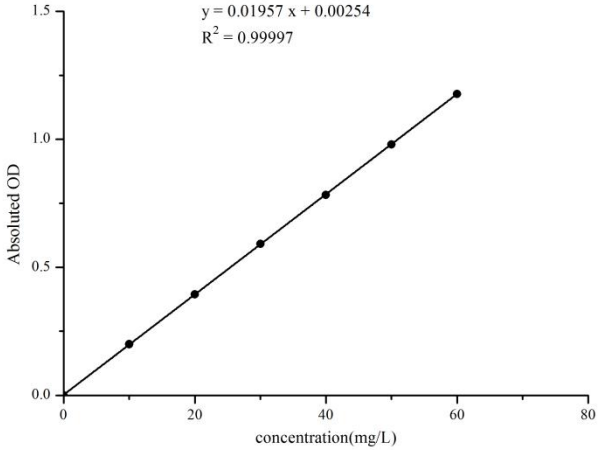
The analytical sensitivity of the assay is 0.072 mg/L. This was determined by adding two standard deviations to the mean O.D. obtained when the zero standard was assayed 20 times, and calculating the corresponding concentration.

2. Standard curve

(It doesn't need to prepare the standard curve for this kit and the provided standard curve is for reference only)

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 (mg/L)	0	10	20	30	40	50	60
Average OD	0	0.200	0.395	0.592	0.783	0.980	1.177
Absoluted OD	0	0.200	0.395	0.592	0.783	0.980	1.177



Appendix II Example Analysis

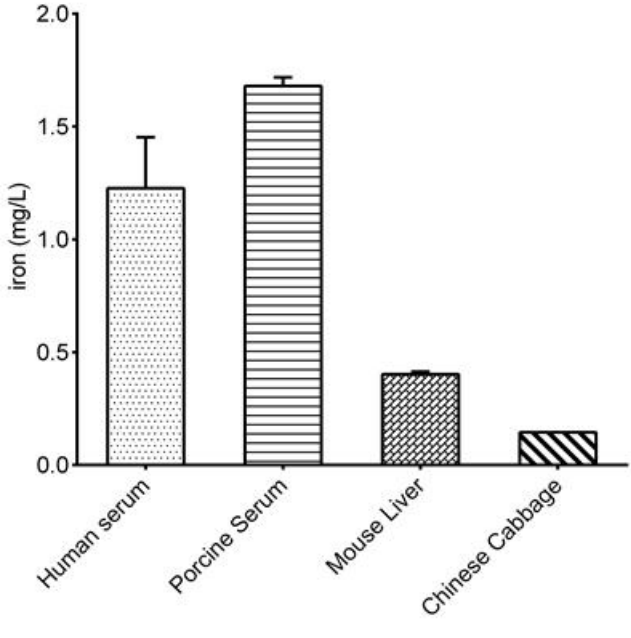
Example analysis：

Take 0.5 mL of human serum, carry the assay according to the operation steps. The results are as follows:

The average OD value of the sample is 0.025, the average OD value of the blank is 0.002, the average OD value of the standard is 0.040, the concentration of standard is 2 mg/L, and the calculation result is:

$$\text{Iron content (mg/L)} = \frac{0.025 - 0.002}{0.040 - 0.002} \times 2 = 1.21 \text{ mg/L}$$

Detect human serum, porcine serum, 10% mouse liver tissue homogenate (the concentration of protein in sample is 9.739 mgprot/mL), 10% chinese cabbage tissue homogenate (the concentration of protein in sample is 5.221 mgprot/mL) according to the protocol, the result is as follows：



Appendix III Publications

1. Jiang T, Zhou J, et al. Arbutin alleviates fatty liver by inhibiting ferroptosis via FTO/SLC7A11 pathway[J]. Redox biology, 2023, 68: 102963.
2. Ding Z, Liang X, Wang J, et al. Inhibition of spinal ferroptosis-like cell death alleviates hyperalgesia and spontaneous pain in a mouse model of bone cancer pain[J]. Redox Biology, 2023, 62: 102700.
3. Wang X , Wang K , Mao W ,et al.Emerging perfluoroalkyl substances retard skeletal growth by accelerating osteoblasts senescence via ferroptosis[J].Environmental Research, 2024, 258.DOI:10.1016/j.envres.2024.119483.
4. Pan C , Yan M , Jin H ,et al.Chronic exposure to MC-LR increases the risks of microcytic anemia: Evidence from human and mice[J].Environmental Pollution, 2021, 288:117966-.DOI:10.1016/j.envpol.2021.117966.
5. Yu S , Li Z , Zhang Q ,et al.GPX4 degradation via chaperone-mediated autophagy contributes to antimony-triggered neuronal ferroptosis[J].Ecotoxicology and Environmental Safety, 2022, 234:113413-.DOI:10.1016/j.ecoenv.2022.113413.

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.