Human Anti-SARS-CoV-2 IgM ELISA Kit

For quantitative detection of Anti-SARS-CoV-2 IgM in serum, plasma, and other biological fluids from human.

Cat. No. **08440200**

Size: **96 Tests**

Reactivity: **Human**

Range: **0.78–50 ng/mL**

Sensitivity: **0.469 ng/mL**

Storage: **2–8 °C for 12 months**

Principle: **Indirect ELISA**

Revision Date: **2022-04**

MP

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1. KIT COMPONENTS

No.	Item	Specs	Storage
440201	ELISA Microplate Precoated with a Full-Length SARS-CoV-2 Spike Recombinant Protein (Dismountable)	8×12	2–8 °C / -20 °C
440202	Standard (Recombinant Human anti-Spike IgM, 500 µL, 50 ng/mL)	1 vial	2–8 °C
440203	Sample/Standard Dilution Buffer	20 mL	2–8 °C
440208	HRP-labeled Goat Anti-Human IgM-Fc Antibody (Concentrated)	60 µL	2–8 °C *(protect from light)*
440207	Antibody Dilution Buffer	5 mL	2–8 °C
440205	TMB Substrate	5 mL	2–8 °C *(protect from light)*
440206	Stop Solution	5 mL	2–8 °C
440204	Wash Buffer (25X)	30 mL	2–8 °C
440209	Plate Sealer	5 pieces	
–	Product Description	1 copy	

2. TYPICAL DATA & STANDARD CURVE

Results of a typical standard operation of an Anti-SARS-CoV-2 IgM ELISA Kit are listed below. This standard curve was generated at our lab for demonstration purposes only. Users shall obtain a standard curve via their own experimental results. (N/A = not applicable)

STD (ng/mL)	OD-1	OD-2	Average	Corrected
0	0.062	0.064	0.063	0.000
0.781	0.141	0.149	0.145	0.082
1.562	0.239	0.251	0.245	0.182
3.125	0.453	0.431	0.442	0.379
6.25	0.756	0.778	0.767	0.704
12.5	1.140	1.198	1.169	1.106
25	2.005	1.955	1.980	1.917
50	2.850	2.992	2.921	2.858
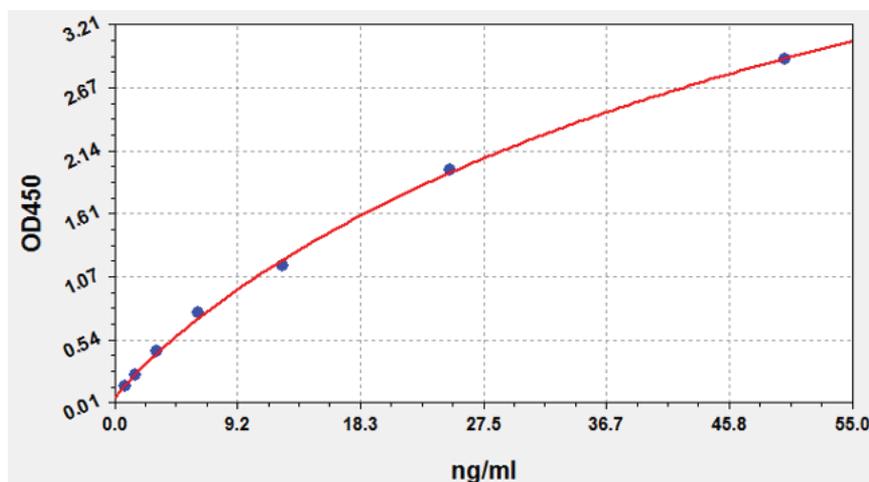
2.1 Sample Test Results

Patients from mobile cabin hospital. Plasma sample dilution 1:100–500.

Patients (µg/mL)				Healthy volunteers (ng/mL)			
#1	7	#5	5.7	#1	not detected	#5	not detected
#2	2.4	#6	2.3	#2	not detected	#6	not detected
#3	12	#7	1.6	#3	not detected	#7	<0.1
#4	6	#8	2.1	#4	<0.2	#8	not detected

2.2 Specificity

This assay has high sensitivity and excellent specificity for detection of Anti-SARS-CoV-2 IgM. No significant cross-reactivity or interference between Anti-SARS-CoV-2 IgM and analogues was observed.

NOTE ▶ *Limited by current skills and knowledge, it is difficult for us to complete the cross-reactivity detection between Anti-SARS-CoV-2 IgM and all the analogues; therefore, cross reaction may still exist.*

2.3 Recovery

Matrices listed below were spiked with various levels of Anti-SARS-CoV-2 IgM and the recovery rates were calculated by comparing the measured value to the expected amount of Anti-SARS-CoV-2 IgM in samples.

Matrix	Recovery Range (%)	Average (%)
Serum (n=5)	85-105	94
EDTA Plasma (n=5)	85-103	91
Heparin Plasma (n=5)	90-99	94

2.4 Linearity

The linearity of the kit was assayed by testing samples spiked with appropriate concentrations of Anti-SARS-CoV-2 IgM and their serial dilutions. The results were demonstrated by percentage of calculated concentration to the expectation.

Sample	1:2	1:4	1:8
Serum (n=5)	90-105%	86-102%	86-105%
EDTA Plasma (n=5)	83-99%	84-101%	84-95%
Heparin Plasma (n=5)	82-95%	80-98%	82-100%

2.5 Precision

Intra-Assay: CV <8%
Inter-Assay: CV <10%

2.6 Stability

The stability of the ELISA kit is determined by the loss rate of activity. The loss rate of this kit is less than 10% within the expiration date under appropriate storage conditions.

Standard (n=5)	37 °C for 1 month	2–8 °C for 12 months
Average (%)	80	95-100

To minimize extra influence on performance, operation procedures and lab conditions, especially room temperature, air humidity, and incubator temperatures should be strictly controlled. It is strongly suggested that the same operator perform the entire assay from beginning to end.

3. OPERATION PROCEDURE

3.1 Principle of the Assay

This kit was based on indirect enzyme-linked immunosorbent assay technology. Antigen was pre-coated onto 96-well plates. The HRP-conjugated antibody was used as detection antibodies. The standards, test samples and HRP-conjugated detection antibody were added to the wells subsequently and washed with wash buffer. TMB substrates were used to visualize the HRP enzymatic reaction. TMB was catalyzed by HRP to produce a blue color product that changed to yellow after adding acidic stop solution. The density of yellow is proportional to the target amount of sample captured in the plate. Read the O.D. absorbance at 450 nm in a microplate reader to calculate the concentration of target.
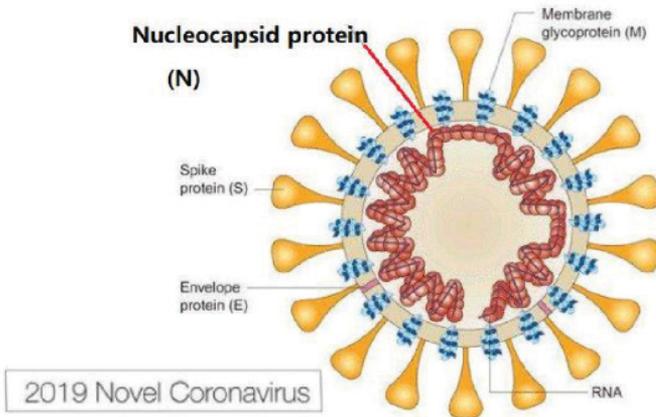
3.2 Precautions

1 To inspect the validity of experiment operation and the appropriateness of sample dilution proportion, a pilot experiment using standards and a small number of samples is recommended.

2 After opening and before using, keep plate dry.

3 Before using the kit, spin tubes and bring down all components to the bottom of the tubes.

4 Store TMB reagents to avoid light.

5 The washing process is very important; incomplete washing can cause a false positive reading and high background.

6 Duplicate well assay is recommended for both standard and sample testing.

7 Avoid letting the microplate dry during the assay—dry plates may inactivate components on the plate.

8 Do not re-use tips and tubes to avoid cross contamination.

9 Avoid mixing reagents from different batches to perform an assay.

3.3 Materials Required, But Not Supplied

▶ **Microplate reader (wavelength: 450 nm)**

▶ **37 °C incubator**

▶ **Automated plate washer**

▶ **Precision single and multi-channel pipette and disposable tips**

▶ **Clean tubes and Eppendorf tubes**

▶ **Deionized or distilled water**

3.4 Washing

Manual: Discard the solution in the plate without touching the side walls. Clap the plate on absorbent filter papers or other absorbent material. Fill each well completely with 350 μL Wash Buffer and soak for 1 to 2 minutes, then aspirate contents from the plate and clap the plate on absorbent filter paper or other absorbent material.

Automated: Aspirate all wells, then wash plate with 350 μL Wash Buffer. After the final wash, invert plate and clap the plate on absorbent filter paper or other absorbent material. It is recommended that the washer shall be set to soak for 1 minute.

NOTE ▶ *Set the height of the needles; be sure the fluid can be sipped up completely.*

3.5 Sample Collection and Storage (universal)

▶ **Serum:** Place whole blood sample at room temperature for 2 hours or place at 2−8 °C overnight, then centrifuge for 20 minutes at approximately 1000 × g. Collect the supernatant and perform the assay immediately. Blood collection tubes should be disposable, non-pyrogenic, and free from endotoxins.

▶ **Plasma:** Collect plasma using EDTA-Na$_2$ or heparin as an anticoagulant. Centrifuge samples for 15 minutes at 1000 × g at 2−8 °C within 30 minutes of collection. Collect the supernatant and perform the assay immediately. Avoid hemolyzed, high cholesterol samples.

▶ **Other Biological Fluids:** Centrifuge samples for 20 minutes at 1000 × g at 2−8 °C. Collect supernatant and carry out the assay immediately.

NOTE ▶ *Samples to be used within 5 days can be stored at 2−8 °C; otherwise, store samples at -20 °C (assay ≤1 month) or -80 °C (assay ≤2 months) to avoid loss of bioactivity and contamination. Avoid multiple freeze-thaw cycles. Hemolyzed samples are not suitable for this assay.*

3.6 Sample Dilution

The user should estimate the concentration of target protein in the test sample and select a proper dilution factor to ensure the diluted target protein concentration falls within the optimal detection range of the kit. Dilute the sample with the provided dilution buffer; several trials may be necessary. The test sample must be well mixed with the dilution buffer and standard curves and sample should be made during the pre-experiment. If samples have very high concentrations, dilute samples with PBS first, then dilute with Sample Dilution.

The matrix components in the sample will affect the test results and need to be diluted at least 1:50 with Sample Dilution Buffer prior to testing!

3.7 Reagent Preparation and Storage

Bring all reagents and samples to room temperature for 20 mins before use.

1 Wash Buffer:

If crystals have formed in the concentrate, warm with a 40 °C water bath (heating temperatures should not exceed 50 °C) and mix gently until the crystals have completely dissolved. The solution should be cooled to room temperature before use.

Dilute 30 mL Concentrated Wash Buffer into 750 mL Wash Buffer with deionized or distilled water. Return unused solution back to 2–8 °C for storage.

2 Standards:

1. Add 0.3 mL Sample Dilution Buffer into one tube (labeled as zero tube), transfer 0.3 mL from standard tube (50 ng/mL) to zero tube, and mix thoroughly.

NOTE ▶ *If the Standard tube concentration is higher than the range of the kit, please dilute it and label it as the zero tube.*

2. Label 7 EP tubes with 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 and blank, respectively. Add 0.3 mL of the Sample Dilution Buffer into each tube. Add 0.3 mL of the above Standard Solution (from zero tube) into 1st tube and mix thoroughly. Transfer 0.3 mL from 1st tube to 2nd tube and mix thoroughly. Transfer 0.3 mL from 2nd tube to 3rd tube and mix thoroughly, and so on. Sample Dilution Buffer was used for the blank control.

Prepare standard solutions
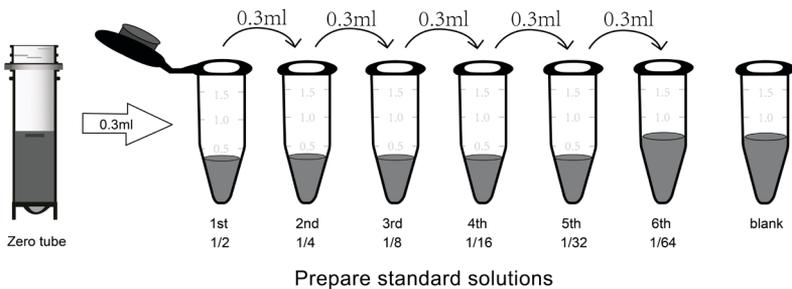
NOTE ▶ *It is best to use Standard Solutions within 15 mins.*

3 **Preparation of HRP-labeled Antibody Working Solution:**
Prepare within 30 mins of initiating the experiment.

1. Calculate required total volume of the working solution:
   50 μL / well × quantity of wells (allow 55–60 μL more than
   the total volume).

2. Dilute the HRP-detection antibody with Antibody Dilution Buffer
   at 1:100 and mix thoroughly (i.e. add 1 μL HRP-labeled antibody
   to 99 μL Antibody Dilution Buffer).

3.8 Assay Procedure

When diluting samples and reagents, they must be mixed completely and
evenly. Before adding TMB into wells, equilibrate TMB Substrate for 30 mins
at 37 °C. It is recommended to plot a standard curve for each test.

1 Set standard, **test samples (diluted at least 1:50 with Sample Dilution
Buffer)**, control (blank) wells on the pre-coated plate, respectively, and
record their positions. It is recommended to measure each standard
and sample in duplicate. **Wash plate 2 times before adding standard,
sample and control (blank) wells!**

2 **Prepare Standards:** Aliquot 50 μL of zero tube, 1st tube, 2nd tube, 3rd
tube, 4th tube, 5th tube, 6th tube and Sample Dilution Buffer (blank)
into the standard wells.

3 **Add Samples:** Add 50 μL of properly diluted sample into test sample wells.

4 **Incubate:** Seal the plate with a cover and incubate at 37 °C for 30 mins.

5 **Wash:** Remove the cover and discard the plate contents, then wash the
plate 3 times with Wash Buffer. Do NOT let the wells dry completely at
any point.

6 **HRP-labeled Antibody:** Add 50 μL HRP-labeled antibody working solution into above wells (standard, test sample and blank wells). Add the solution at the bottom of each well without touching the sidewall, cover the plate and incubate at 37 °C for 30 mins.

7 **Wash:** Remove the cover and wash plate 5 times with Wash Buffer, then let the Wash Buffer stay in the wells for 1–2 mins each time.

8 **TMB Substrate:** Add 50 μL TMB Substrate into each well, cover the plate and incubate at 37 °C in the dark within 10–15 mins.
NOTE ▶ *The reaction time can be decreased or extended according to the actual color change, but not more than 30 mins. The reaction can be terminated when a gradient appears in standard wells.*

9 **Stop:** Add 50 μL Stop Solution to each well. The color will turn yellow immediately. The addition order of Stop Solution should be the same as the TMB Substrate Solution.

10 **OD Measurement:** Read the O.D. absorbance at 450 nm in a Microplate Reader immediately after adding the Stop Solution.

Regarding calculation, (the relative O.D. 450) = (the O.D. 450 of each well) – (the O.D. 450 of blank well). The standard curve can be plotted as the relative O.D. 450 of each standard solution (Y) vs. the respective concentration of the standard solution (X). The target concentration of the samples can be interpolated from the standard curve. It is recommended to use some professional software to do this calculation, such as Curve Expert 1.3 or 1.4.

NOTE ▶ *If the samples measured were diluted, multiply the dilution factor by the concentration from interpolation to obtain the concentration before dilution.*

3.9 Summary
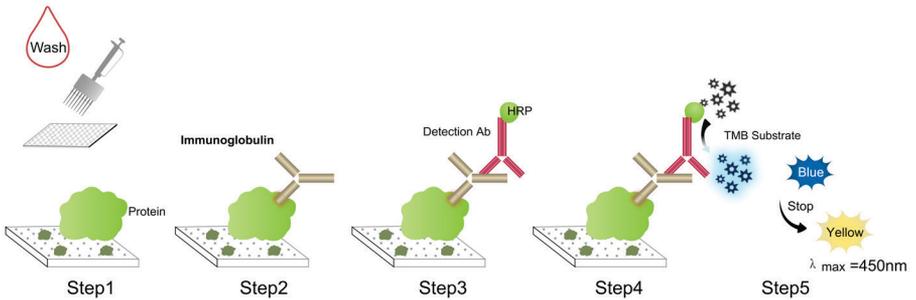
STEP 1: Wash plate 2 times before adding Standard, **Sample (diluted at least 1:50 with Sample Dilution Buffer)** and Control (blank) wells!

STEP 2: Add 50 µL standard or sample to each well and incubate for 30 mins at 37 °C.

WASH STEP: Aspirate and wash plates 3 times.

STEP 3: Add 50 µL HRP-labeled antibody working solution to each well and incubate for 30 mins at 37 °C.

WASH STEP: Aspirate and wash plate 5 times.

STEP 4: Add 50 µL TMB Substrate Solution. Incubate 10–15 mins at 37 °C.

STEP 5: Add 50 µL Stop Solution. Read at 450 nm immediately and perform calculations.

4. RELATED PRODUCTS

4.1 ELISA Kits

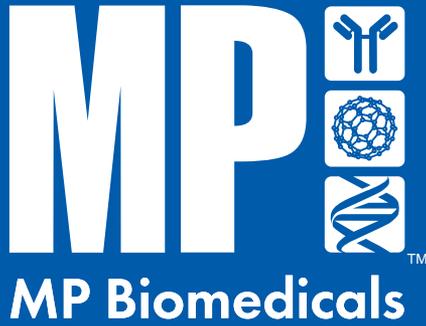| Research Focus	Product Name	Cat. No.
Wild type & Omicron Variant Quantification	SARS-CoV-2 Nucleoprotein (Wild-type) ELISA Kit, 96 Tests	08440300
	SARS-CoV-2 Nucleoprotein (Omicron, B.1.1.529) ELISA Kit, 96 Tests	08L100020
Human Immune Response	Human anti-SARS-CoV-2 IgG ELISA Kit, 96 Tests	08440100
	Human anti-SARS-CoV-2 IgM ELISA Kit, 96 Tests	08440200

4.2 SARS-CoV-2 Monoclonal Antibodies

Against Domain	Product Name	Application	Cat. No.
Nucleoprotein	SARS-CoV-2 Nucleoprotein Rabbit mAb	ELISA, WB, FCM, IHC, IF, IP	08L100001
Spike RBD	SARS-CoV-2 Spike RBD Mouse mAb	ELISA, WB, IF	08L100002
Spike S1	SARS-CoV-2 Spike S1 Rabbit mAb	ELISA, FCM, IF, IP	08L100003
	SARS-CoV-2 Spike S1 Mouse mAb	WB, IP	08720301/2
Spike S2	SARS-CoV-2 Spike S2 Mouse mAb	WB, FCM, Virus Neutralization	08720401/2
	SARS-CoV-2 Spike S2 (B) Mouse mAb	WB, FCM, Virus Neutralization	08720411/2
Human/Mouse/ Rat ACE2	ACE2 Rabbit mAb	WB, IHC, IF	08L100004

4.3 Recombinant Proteins

Domain	Product Name	Expression Host	Tag	Cat. No.
Spike S1	SARS-CoV-2 Spike S1 Protein	HEK293 cells	C-His	08L100005
	Biotinylated SARS-CoV-2 Spike S1 Protein	HEK293 cells	C-His-Avi	08L100006
Spike S2	SARS-CoV-2 Spike S2 ECD Protein	Sf9 cells	C-His	08L100007
Spike RBD	SARS-CoV-2 Spike RBD Protein	HEK293 cells	C-His	08L100008
	Biotinylated SARS-CoV-2 Spike RBD Protein	HEK293 cells	C-His-Avi	08L100009
Spike S1+S2	SARS-CoV-2 S1+S2 ECD (pre-fusion) Protein	HEK293 cells	C-His	08L100010
	SARS-CoV-2 S1+S2 ECD (pre+post-fusion) Protein	HEK293 cells	C-His	08L100011
Nucleocapsid	SARS-CoV-2 Nucleocapsid Protein	E. coli BL21 (DE3)	N-& C-His	08720501/2
	SARS-CoV-2 Nucleocapsid Protein	Sf9 cells	N-His	08L100012
Other	Biotinylated SARS-CoV-2 3C-like Proteinase	E. coli BL21 (DE3)	N-His & Avi	08L100013
	SARS-CoV-2 papain-like Protease	E. coli BL21 (DE3)	N-His	08L100014
Omicron Variant	SARS-CoV-2 Spike S1 (B.1.1.529/Omicron) Protein	HEK293 cells	His tag	08L100015
	SARS-CoV-2 Spike S (B.1.1.529/Omicron) Trimer	HEK293 cells	C-His	08L100016
	SARS-CoV-2 Spike RBD (B.1.1.529/Omicron) Protein	HEK293 cells	His tag	08L100017
	Biotinylated SARS-CoV-2 Spike S1 (B.1.1.529/Omicron)	HEK293 cells	C-His-Avi tag	08L100018
ACE2	Human ACE2 Protein	E. coli BL21 (DE3)	N-& C-His	08720601/2
	Human ACE2 Protein	HEK293 cells	N-His	08L100019

NOTES:

MP BIOMEDICALS