SARS-CoV-2 S1 IgM ELISA Kit (CAT NO: 41A246R)

For qualitative determination of human anti-SARS-CoV-2 S1 protein ELISA (IgM class antibodies) in serum or plasma samples

This package insert must be read in its entirely before using this product.
SARS-CoV-2 S1 IgM ELISA Kit
Enzyme-linked Immunosorbent Assay for qualitative detection of IgM class antibodies against the S1 of SARS-CoV-2 in human blood.

Catalog Numbers 41A246R
(Please read this instruction manual carefully before use.)

WARNING! Wear appropriate protective eyewear, clothing and gloves.

BACKGROUND
SARS-CoV-2 is an enveloped virus with a positive-sense RNA genome and a nucleocapsid of helical symmetry. The SARS-CoV-2 entry into host cells is mediated by the transmembrane spike (S) glycoprotein, which is the main target of neutralizing antibodies upon infection and the focus of the therapeutic and vaccine design. S comprises two functional subunits responsible for binding to the host cell receptor (S1 subunit) and fusion of the viral and cellular membranes (S2 subunit). The distal S1 subunit comprises the receptor-binding domain (RBD) and contributes to stabilization of the prefusion state of the membrane-anchored S2 subunit that contains the fusion machinery.

INTENDED USE
SARS-CoV-2 S1 IgM ELISA Kit is a highly sensitive and specific immunoassay developed by ImmunoDiagnostics for qualitative detection of IgM class antibodies against the S1 of SARS-CoV-2 in human blood.

This product is intended for research use only.

ASSAY PRINCIPLE
96-well plates are coated with SARS-CoV-2 S1 protein that captures antibodies against SARS-CoV-2 S1 protein in the sample. After washing away unbound materials, captured IgM against SARS-CoV-2 S1 protein is detected by anti-human IgM polyclonal antibodies conjugated with horse radish peroxidase (HRP). After washing step, the chromogenic substrate 3,3’5,5’-tetramethylbenzidine (TMB) is added. Color reaction is stopped by 2M H₂SO₄. The amount of IgM class antibodies against SARS-CoV-2 S1 captured inside the wells is proportional to the color density generated in the coupled oxidation-reduction reaction.

REAGENTS SUPPLIED
Each kit is sufficient for 96 tests and contains the following components:
1. One aluminum pouch with a Microwell plate (12 strips of 8 wells each) coated with SARS-CoV-2 S1 protein, sealed. The microwell strips can be used separately.
2. 10×Wash buffer-40 ml.
3. 5×Assay buffer-20 ml.
4. 100xDetection antibody solution: HRP-conjugated anti-human IgM, 0.12 ml.
5. 10x Human anti-S1 mAb (positive control), 22 ul
7. Stop solution, 12 ml, ready for use.
8. Blank control, 0.5 ml, ready for use

OTHER MATERIALS REQUIRED, BUT NOT PROVIDED
1. Pipettes and pipette tips.
2. Beakers, flasks, cylinders necessary for preparation of reagents.
3. Buffer and reagent reservoirs.
4. Paper towels or absorbent paper.
5. Plate reader capable of reading absorbency at 450 nm.
6. Distilled water or deionized water.
7. Statistical calculator with program to perform regression analysis.
STORAGE
- The kit should be stored at 2-8°C, and all reagents should be equilibrated to room temperature before use. Immediately after use remaining reagents should be returned to cold storage (2-8°C).
- Expiry of the kit and reagents is stand on labels.
- Once opened, the strips may be stored at 2-8°C for up to one month.

SAMPLE COLLECTION AND STORAGE INSTRUCTIONS
Handle serum or plasma sample in accordance with National Committee for Clinical Laboratory Standards guidelines for preventing transmission of blood-borne infection.
- Do not use grossly hemolyzed or lipemic samples.
- Human Serum: Use a blood separator tube and allow sample to clot for 30 minutes, then centrifuge for 10 minutes at 1000g. **When the human serum is tested, it should be diluted 100-fold at least.**
- Human plasma: Treat blood with anticoagulant such as citrate, EDTA or heparin. Centrifuge for 10 minutes at 1000g within 30 minutes for plasma collection. **When the human plasma is tested, it should be diluted 100-fold at least.**
- Samples cannot be tested immediately should be aliquoted and must be stored frozen below -20°C. Avoid repeated freeze-thaw cycle.
- Perform preliminary experiment to determine the optimum detection sample dilution.

PRECAUTIONS FOR USE
- All chemicals should be considered as potentially hazardous. Avoid contact with skin and eyes.
- In the case of contact with skin or eyes wash with water.
- Do not use kit reagents beyond expiration date.
- Do not expose kit reagents to strong light.
- Do not pipet by mouth.
- Do not eat or smoke in area where kit reagents or samples are handled.
- Use only sufficient volume of specimen as indicated in the procedure steps. Failure to do so, may cause low sensitivity of the assay.
- Avoid contact of substrate solution with oxidizing agents and metal.
- Use disposable pipette tips and/or pipettes.
- Use clean, dedicated reagent trays for dispensing the conjugate and substrate reagent.
- Do not touch the exterior bottom of the wells; fingerprints or scratches may interfere with the reading. When reading the results, ensure that the plate bottom is dry and there are no air bubbles inside the wells.
- The enzymatic activity of the HRP-conjugate might be affected from dust and reactive chemical and substances like sodium hypochlorite, acids, alkalis etc. Do not perform the assay in the presence of these substances.
- Substrate solution must be at room temperature prior to use.

PREPARATION OF REAGENTS
Bring all reagents and materials to room temperature before use
1. 1×Wash buffer
Prepare 1×Wash buffer by mixing the 10×Wash buffer (40 ml) with 360 ml of distilled water or deionized water. If precipitates are observed in the 10× Wash buffer bottle, warm the bottle in a 37°C water bath until the precipitates disappear. The 1×Wash buffer may be stored at 2-8°C for up to one month.
2. 1×Assay buffer
Prepare 1x assay buffer by mixing the 5x assay buffer (20 ml) with 80 ml of distilled water or deionized water. If precipitates are observed in the 5x assay buffer bottle, warm the bottle in a 37°C water bath until the precipitates disappear. The 1x assay buffer may be stored at 2-8°C for up to one month.
3. 1×Detection antibody solution.
Spin down the 100×Detection antibody solution briefly and dilute the desired amount of the antibody 1:100 with 1×Assay buffer, 100 μL of 1×Detection antibody solution is required per well. Prepare only as much 1×Detection antibody solution as needed. Return the 100×Detection antibody solution to 2-8°C immediately after the necessary volume is pipetted.

**PREPARATION OF SAMPLES AND POSITIVE CONTROL**
Serum or plasma sample is generally required a **100-fold dilution** in the 1X Assay buffer. A suggested dilution step is to add 2 μL of sample to 198 μL of 1X Assay buffer. Dilution factor can be adjusted based on the titer of the antibodies in the samples. Centrifuge it briefly before open the tube. Add 200 μL of 1X Assay buffer and mix thoroughly.

**ASSAY PROCEDURE**
*It is recommended that all samples be assayed in duplicate.*
1. 100μl of Blank Control and 100μl of Positive Control into their respective wells, and incubate at room temperature for 1 hour, preferably with shaking at 600 rpm. Duplicate test is recommended.
2. Discard the content and tap the plate on a clean paper towel to remove residual solution in each well. Add 300 μl of 1×Wash buffer to each well and incubate for 1 minute. Discard the 1×Wash buffer and tap the plate on a clean paper towel to remove residual wash buffer. Repeat the wash step for a total of 3 times.
3. Add 100 μl of 1×Detection antibody solution to each well, incubate at room temperature for 1 hour.
4. Wash each well 3 times as described in step 2.
5. Add 100 μl of Substrate solution to each well, incubate at room temperature for 15 minutes. Protect from light.
6. Add 100 μl of Stop solution to each well, gently tap the plate frame for a few seconds to ensure thorough mixing.
7. Determine the optical density of each well at 450 nm immediately.

**TYPICAL DATA**

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**Serum from COVID-19 patients**

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Average 0.11375

Average 1.2481
PRECISION

Intra-assay: Three different known levels of positive control were spiked into sample buffer as test samples. All samples were tested on the same plate to evaluate intra-assay precision of the kit. The Intra-assay precision of this kit is less than 8%.

Inter-assay: Three different known levels of control were spiked into sample buffer as test samples. All samples were tested in 3 separate assays to evaluate intra-assay precision of the kit. Inter-assay precision of this kit is less than 10%.

PRECAUTIONS AND SAFETY

1. The ELISA assays are time and temperature sensitive. To avoid incorrect result, strictly follow the test procedure steps. 1. Do not exchange reagents from different lots or use reagents from other commercially available kits. The components of the kit are precisely matched for optimal performance of the tests.

2. Make sure that all reagents are within the validity indicated on the kit box and of the same lot. Never use reagents beyond their expiry date stated on labels or boxes.

3. CAUTION - CRITICAL STEP: Allow the reagents and specimens to reach room temperature (20-25°C) before use. Shake reagent gently before use. Return at 2-8°C immediately after use.

4. Use only sufficient volume of specimen as indicated in the procedure steps. Failure to do so, may cause low sensitivity of the assay.

5. Do not touch the exterior bottom of the wells; fingerprints or scratches may interfere with the reading. When reading the results, ensure that the plate bottom is dry and there are no air bubbles inside the wells.

6. Never allow the microplate wells to dry after the washing step. Immediately proceed to the next step. Avoid the formation of air bubbles when adding the reagents.

7. Avoid long time interruptions of assay steps. Assure same working conditions for all wells.

8. Calibrate the pipette frequently to assure the accuracy of specimens/reagents dispensing. Use different disposal pipette tips for each specimen and reagents in order to avoid cross-contaminations.

9. When adding specimens, do not touch the well’s bottom with the pipette tip.

10. When measuring with a plate reader, determine the absorbance at 450nm or at 450/600~650nm.

11. The enzymatic activity of the HRP-conjugate might be affected from dust and reactive chemical and substances like sodium hypochlorite, acids, alkalis etc. Do not perform the assay in the presence of these substances.

12. All specimens from human origin should be considered as potentially infectious. Strict adherence to GLP (Good Laboratory Practice) regulations can ensure the personal safety.

14. Chemical should be handled and disposed of only in accordance with the current GLP (Good Laboratory Practices) and the local or national regulations.

15. The pipette tips, vials, strips and specimen containers should be collected and autoclaved for not less than 2 hours at 121°C or treated with 10% sodium hypochlorite for 30 minutes to decontaminate before any further steps of disposal. Solutions containing sodium hypochlorite should NEVER be autoclaved. Materials Safety Data Sheet (MSDS) available upon request.

16. Some reagents may cause toxicity, irritation, burns or have carcinogenic effect as raw materials. Contact with the skin and the mucosa should be avoided but not limited to the following reagents: the Stop solution, the Substrate solution, and the Wash buffer.

17. The Stop solution 2M H$_2$SO$_4$ is an acid. Use it with appropriate care. Wipe up spills immediately and wash with water if come into contact with the skin or eyes.
SUMMARY OF ASSAY PROCEDURE

Add 100 μl of sample to each well.

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Incubate at room temperature for 1 hour, preferably with shaking at 600 rpm.

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Aspirate and wash each well three times.

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Add 100 μl of 1×Detection antibody solution to each well.

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Incubate at room temperature for 1 hour.

↓

Aspirate and wash each well three times.

↓

Add 100 μl of Substrate solution to each well.

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Incubate at room temperature for 15 minutes.

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Add 100 μl of Stop solution to each well.

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Measure absorbance of each well at 450 nm.

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Interpretation