BIOGENIX INC. PVT. LTD.

# Vitamin B12
# ELISA TEST SYSTEM

**96 TESTS** Σ

IVD

## INTENDED USE

Vitamin B12 ELISA test system is intended for the quantitative determination of Vitamin B12 in human serum and plasma.

## PRINCIPLE OF THE TEST

The B12 test kit is a solid phase enzyme-linked immunoassay (ELISA), based on the principal of delayed competitive binding. Streptavidin coated wells are incubated with extracted Vitamin B12 standards, controls, samples, and Intrinsic Factor-Biotin conjugate at room temperature for 45 minutes. During the incubation, the biotin-labeled intrinsic factor will bind to the Vitamin B12 in the sample, standard, or quality control serum. After the 45-minute incubation, Vitamin B12-Enzyme conjugate is added which competes with the Vitamin B12 of the sample, standard, or quality control serum for remaining sites on the Intrinsic Factor for an additional 30 minutes. All unbound conjugates are then removed, and the wells are washed. Next, a solution of TMB Reagent is added and incubated at room temperature for 15 minutes, resulting in the development of blue color. The color development is stopped with the addition of stop solution, and the absorbance is measured spectrophotometrically at 450 nm. A standard curve is obtained by plotting the concentration of the standard versus the absorbance. The color intensity is inversely proportional to the amount of Vitamin B12 in the sample. The total assay procedure run time is 1.5 hours.

## MATERIALS AND COMPONENTS

- Microwells coated with Streptavidin (12x8x1)
- Vitamin B12 Standard Set: 6 vials (ready to use) 0.5 mL
- Biotinylated Intrinsic Factor Reagent, 1 bottle (ready to use) 7 mL
- B12-Enzyme Conjugate, 1 bottle (ready to use) 7 mL
- Extraction Buffer, 1 bottle (ready to use) 8 mL
- Neutralization Buffer, 1 bottle (ready to use) 8 mL
- TCEP Solution, 1 bottle (40x) 0.25 mL
- Stop Solution, 1 bottle (ready to use) 12 mL
- TMB Substrate, 1 bottle (ready to use) 12 mL
- Wash Concentrate 20X, 1 bottle 25 mL

## MATERIALS REQUIRED BUT NOT PROVIDED

- Precision pipettes
- Disposable pipette tips
- ELISA reader capable of reading absorbance at 450nm
- Flat-head Vortex mixer
- Plate shaker
- Test tubes for sample preparation

## PRECAUTIONS

1. Potential biohazardous materials:
   The calibrator and controls contain human source components which have been tested and found non-reactive for hepatitis B surface antigen as well as HIV antibody with FDA licensed reagents. However, as there is no test method that can offer complete assurance that HIV, Hepatitis B virus or other infectious agents are absent, these reagents should be handled at the Biosafety Level 2, as recommended in the Centers for Disease Control/National Institutes of Health manual, "Biosafety in Microbiological and Biomedical Laboratories." 1984
2. This kit is intended for the quantitation of B12 in human serum.
3. Do not pipette by mouth. Do not smoke, eat, or drink in the areas in which specimens or kit reagents are handled.
4. The components in this kit are intended for use as an integral unit. The components of different lots should not be mixed.
5. Keep components of this kit protected from light and prolonged exposure to air.
6. It is recommended that standards, control and serum samples be run in duplicate
7. Optimal results will be obtained by strict adherence to this protocol. Accurate and precise pipetting, as well as following the exact time and temperature requirements prescribed are essential. Any deviation from this may yield invalid data.

## SPECIMEN COLLECTION

Serum, heparinized plasma or EDTA plasma samples can be used for the assay.

- For serum, collect whole blood by venipuncture and allow clotting.
- For plasma, mix the sample by gentle inversion prior to centrifugation.

Centrifuge and separate serum or plasma as soon as possible after collection. Do not use hemolyzed samples.

The specimens may be refrigerated at 2-8°C for two weeks. For long term storage, they can be stored at - 20°C. Avoid repeated freeze-thaw cycles. Allow the refrigerated or frozen-thawed samples to equilibrate to room temperature for 30 minutes before use; samples must be mixed before analysis.

## REAGENT PREPARATION

Before running the test, prepare the following:

**1. Extraction Agent:**

Immediately before use, dilute an aliquot of the TCEP solution 1:40 with the extraction buffer. For example, to make 1 mL of extraction agent, add 25uL of TCEP solution to 975uL of extraction buffer.

**2. Sample Extraction:**

Label enough test tubes for each of the standards, samples and controls. Add 50uL of each sample to be tested to individual tubes. Once all the samples have been added, pipette 25uL of extraction reagent to each sample. Vortex test tube after each addition. Allow the extraction to proceed for 15 minutes. After 15min, pipette 25uL of neutralization buffer to each sample. Vortex test tube after each addition. Allow the samples to stand for 5 minutes to ensure complete neutralization**. Double all volumes for samples to be run as replicates**. **NOTE: Consistent extraction times are critical for consistent assay results.**

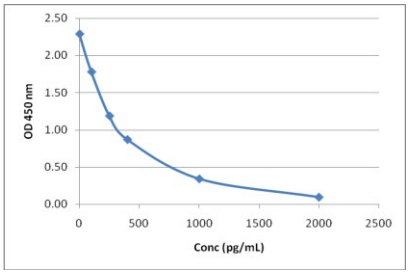
3. **Prepare 1X Wash Buffer** by adding the contents of the bottle (25 ml, 20X) to 475 ml of distilled or deionized water. Store at room temperature (20-25°C).

## TEST PROCEDURE

All reagents and specimens must be allowed to come to room temperature before use. All reagents must be GENTLY mixed without foaming. Once the procedure has started, all steps should be completed without interruption.

1. Place the desired number of coated strips into the holder.
2. Dispense 50µl of extracted B12 Standards, controls and samples into appropriate wells.,
3. Dispense 50µl of biotinylated intrinsic factor reagent, into each well. Shake the microplate gently for 20-30 seconds to mix.
4. Incubate for 45 minutes, at room temperature (20-25°C).
5. Add 50µl of enzyme conjugate into all the wells. Shake the microplate gently for 20-30 seconds to mix.
6. Incubate for 30 minutes, at room temperature (20-25°C).
7. Briskly shake out the contents of the wells. Rinse the wells 3 times with 1X wash buffer. Strike the wells sharply on absorbent paper to remove residual water droplets.
8. Using a multi-channel pipette, dispense 100 µl of TMB Substrate into each well.
9. Incubate for 15 minutes at room temperature, preferably in the dark.
10. Add 50µl of stop solution to each well and gently mix until a uniform color, in each well, is obtained.
11. Read the absorbance in each well at 450nm within 15 minutes after adding the stop solution.

**Standard Curve:**
Six standard levels are included for each run. A typical standard curve is shown below.




| Vitamin B12, (pg/ml) | Absorbance (450nm) |
|---|---|
| 0 | 2.29 |
| 100 | 1.78 |
| 250 | 1.19 |
| 400 | 0.87 |
| 1000 | 0.34 |
| 2000 | 0.09 |

## QUALITY CONTROL

We recommend that each laboratory uses Vitamin B12 anemia controls to validate the performance of reagents.

## PERFORMANCE CHARACTERISTICS

**1. PRECISION**

**Intra-Assay Study**

| Serum | No. of Replicates | Mean (ng/ml) | Standard Deviation | Coefficient of Variation % |
|---|---|---|---|---|
| 1 | 24 | 210 | 13.07 | 6.23 |
| 2 | 24 | 691 | 37.60 | 5.44 |
| 3 | 24 | 1783 | 37.44 | 2.10 |

**Inter-Assay Study**

| Serum | No of Replicates | Mean, ng/ml | Standard Deviation | Coefficient of Variation (%) |
|---|---|---|---|---|
| 1 | 24 | 201 | 12.57 | 6.25 |
| 2 | 24 | 645 | 44.19 | 6.85 |
| 3 | 24 | 1773 | 30.72 | 1.73 |

**2. SENSITIVITY**

The sensitivity of this test kit is 41 pg/ml. The sensitivity was determined by calculating the mean plus 2SD of the standard zero point tested 20 times in the same run.

**3. SPECIFICITY**

Specificity of the intrinsic factor was tested against the selected compounds by adding the compounds in various concentrations to the standard diluent.

| Analyte | Interference |
|---|---|
| Hemoglobin | ND |
| Bilirubin | ND |
| Biotin | ND |
| Cobinamide | ND |

**4. REFERENCE RANGE**

It is strongly recommended that each laboratory should establish its own reference range for the population it serves. Until then, the following literature-based references can be used for normal ranges.

| Population | Reference Range |
|---|---|
| Newborn | 160 - 1300 pg/mL |
| Adult | 200 - 835 pg/mL |
| Adult >60 y | 110 - 800 pg/mL |

## RESULTS

Results are expressed in pg/mL. Note: To convert to pmol/L, multiply results by 0.783. Example: 200 pg/ml = 157 pmol/L.

## REFERENCES

1. Tietz Textbook of Clinical Chemistry, Third Edition. Carl A. Burtis and Edward R. Ashwood, eds. Philadelphia, PA: WB Saunders, 1999.

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