Application Note

Stability of Thermo Scientific Nunc Immuno MaxiSorp Surfaces

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Thermo Scientific Nunc Immuno MaxiSorp products are the result of extensive research in order to produce surfaces with a high and uniform immunoglobulin binding capacity.

However, the elaborate adsorption qualities of Nunc™ MaxiSorp™ surfaces may change if the product is handled incorrectly, e.g. by exposure to UV light or high temperatures.

This report describes the temperature influence on Nunc Immuno™ MaxiSorp products stored for various periods of time.

Materials and Methods

Immuno Plates MaxiSorp F96 from one batch were used in all experiments, except in the batch to batch variation analysis. After exposing the plates to different temperatures for various periods of time, the surface stability was tested using the binding uniformity test (described in Thermo Scientific Nunc Bulletin No. 4). In short, a mixture of enzyme-conjugated and unconjugated antibodies in carbonate buffer, pH 9.6, was added to each well (200 µL/well). After incubation overnight, each well was washed 3 times with PBS containing 0.05% Triton X-100.

Color development by substrate reaction was read on an Immuno Reader NJ 2000. The mean, standard deviation, and CV were calculated using in-house software on an IBM-AT computer.

Storage at the following temperatures was used to simulate various storage/transport conditions: +60°C, +37°C, +4°C, room temperature (+20°C), –70°C, and outdoor temperature variations.

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Results

Plates produced in a five year period were compared in order to make sure that storage at room temperature did not change the binding properties of the MaxiSorp surfaces. The results from this batch to batch comparison are shown in Fig. 1. Seven different batches were tested, and only a slight variation in the binding capacity was observed.

This means that under standard storage conditions at room temperature, MaxiSorp products can be kept in stock for at least 4 years without affecting the surface binding capacity.

All other results are expressed as a percentage of values obtained simultaneously from plates kept at room temperature.

Transport during winter in cold climates may lead to exposure to extremely low temperatures for short periods of time, e.g. during air transport. In Fig. 2 are shown the results of plates stored at –70°C. Plates were stored for up to one month, and as indicated in the figure, no significant change occurred when compared with plates stored at room temperature.

In hot climates the products may be exposed to temperatures well above +40°C for short or long time periods. The effect of exposure to high temperatures was demonstrated by storing plates at +60°C (results are shown in Fig. 2). The signal level decreased by 30% after three days of storage, but remained thereafter constant for the rest of the observation period (42 days).

Plates stored at room temperature, +4°C, +37°C, and plates stored outdoor (packed in a plastic bag) were followed for more than one year. The results are shown in Fig. 3.

There was no significant difference between the results obtained for plates stored at +4°C, at room temperature, or outdoor. However, after being stored at +37°C for 150 days, the plates showed a 10% decrease in signal as compared to those stored at room temperature. But after this period no further decrease could be observed for up to one year of storage.

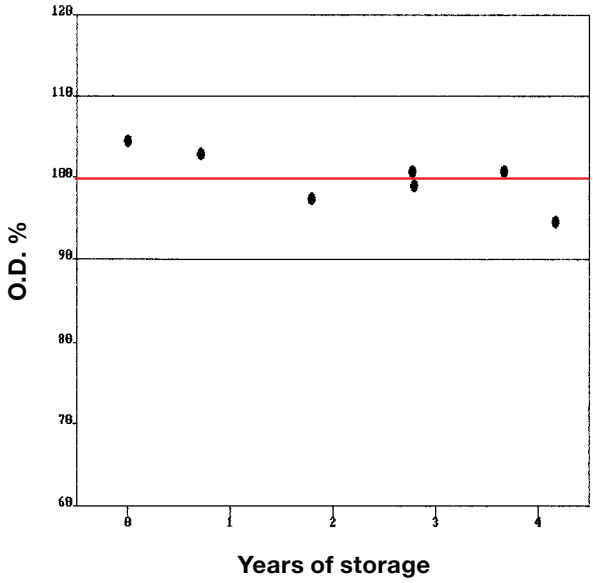

Fig. 1

Simultaneous adsorption performances of individual plate batches (●) produced fin a 5 year period and stored under standard conditions at room temperature. The values are given in percent of their common mean (red line). Note that the values stay between +/–5% from the mean during storage for more than 4 years.

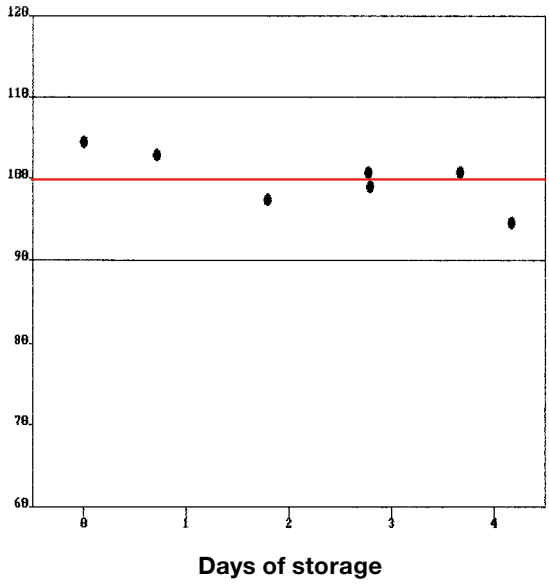

Fig. 2

Adsorption by plates stored at –70°C (■) and at +60°C ( ) in percent of adsorption by plates kept at room temperature (red line). Whereas cold storage implies no change, storage at +60°C quickly reduces adsorption to a constant level at about 70% of the initial value.

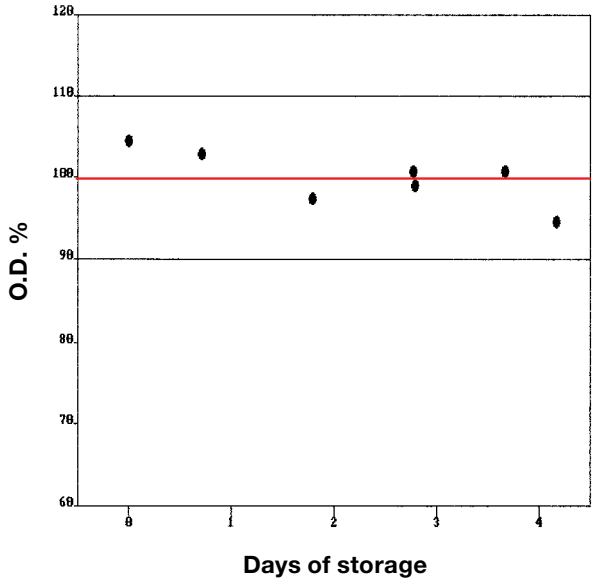

Fig. 3

Adsorption by plates stored at +4°C (□), outdoor (V), and at +37°C (▲) in percent of adsorption by plates kept at room temperature (red line). Whereas storage at +4°C or outdoors implies no change, storage at +37°C slowly reduces adsorption to a constant level at about 90% of the initial value.

Conclusion

From these experiments it can be concluded that Immuno MaxiSorp surfaces can be stored for at least one year at temperatures below +37°C without changing their high adsorption properties. Storage at +37°C will reduce the signal level by 10% during the first 150 days, but after that no further decrease can be observed.

Storage at high temperatures, even for short periods, should be avoided as the signal level decreases rapidly at +60°C. However, like plates stored at +37°C, the decrease in signal level will not continue, but will stop at a temperature specific level. For plates stored at +60°C, the signal level decreases to 70% of the value for plates stored at room temperature.

It should be noted that these studies were performed exclusively with IgG. The adsorption of other molecules might respond differently to storage temperature.

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