

**Evaluation of Asynt DrySyn Multi-S Reaction Block**  
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**Introduction**

Asynt have now introduced the Multi-S reaction block to their oil free DrySyn range. The Multi-S is a 3-position block, allowing a maximum of 500 ml at each position. The DrySyn Multi range allows a chemist to run 1, 2, or 3 reactions simultaneously in standard round bottom flasks on one standard stirring hotplate. The DrySyn Multi range comprises of a machined anodized aluminium base with inserts that accept scales up to 100 ml (Multi), 250 ml (Multi-M), and now 500 ml (Multi-S).

This evaluation compares the stirring and heating capabilities of the Multi-S (500 ml) and the Multi-M (250 ml) reaction blocks.

**Equipment Tested**

Asynt DrySyn Multi-S Reaction Block System comprising:  
Base Unit  
Inserts for 500 ml round bottom flasks

Asynt DrySyn Multi-M Reaction Block System comprising:  
Base Unit  
Inserts for 250 ml round bottom flasks

**Note:** Additional inserts are available for the base units. The range of inserts include 10 ml, 25 ml, 50 ml and 100 ml. Other inserts are available for small vials, tubes etc and Asynt can also supply custom inserts for special applications.

Standard Schott and Quickfit round bottom flasks

IKA RCT basic Stirring Hotplate fitted with IKA ETS-D4 fuzzy logic temperature controller

Various stirrer bars were also evaluated in conjunction with the reaction blocks. These were:

Plain stirrer bar with pivot ring

Oval stirrer bar

Rare earth oval stirrer bar

### **Description**

The DrySyn range uses a standard stirring hotplate to stir and heat the flask contents and standard laboratory glassware fits into the inserts. The Multi-S and Multi-M are multiple position blocks (3-place) so the stirring bars are not centrally placed over the hotplate (unless performing one experiment at a time in the central insert position). The base fits over the top surface of the stirring hotplate with the 3 flask positions spaced at 120 ° and is located securely with 3 pegs. The inserts drop into cutouts in the base to accept a wide range of round bottom flasks, vials and tubes. The DrySyn works with standard laboratory glassware so there is no need to purchase expensive specialised glassware and a 3-way clamp is used to secure all 3 flasks. Set-up is very quick and the clamp ensures all glassware is neatly and firmly secured. The DrySyn Multi-S and DrySyn Multi-M allow three reactions to be carried out on one stirrer hotplate-a very small footprint for scales up to 3 x 500 ml.

The base and inserts are all machined out of solid aluminium with a satin anodized finish that should be very durable under standard laboratory conditions. The components are machined to a very close tolerance and the inserts are an excellent fit for the base cutouts, essential for good heat transfer. The base is designed to fit on stirring hotplates with a maximum hotplate diameter of 145 mm, giving it the ability to be used with a wide range of units, from IKA to Heidolph.

Each insert is fitted with a hole to accept a thermocouple probe or fuzzy logic temperature controller. The inserts are clearly marked with their appropriate size of flask, and the base is engraved with the warning that it may be hot.

### **Experimental Procedure**

#### **Evaluation of stirring bars**

The stirring bars listed under '**Equipment tested**' were evaluated for stirring performance. The stirring bar was added to a single round bottom flask (500 ml for Multi-S and 250 ml for Multi-M) containing 100 ml of water and placed in one of the outer inserts in the base unit. The stirring speed was slowly increased and the stirring bar was evaluated for a) stirring performance, and b) stability. The results are summarised in **Table 1**

**Table 1. Evaluation of stirring bars tested individually.**

<b>Stirring bar</b>	<b>Evaluation in DrySyn Multi-S (500 ml)</b>	<b>Evaluation in DrySyn Multi-M (250 ml)</b>
Plain stirrer bar with pivot ring	Stayed centralised. Good vortex at high speed.	Stayed centralised. Good vortex at high speed.
Oval stirrer bar	Stayed centralised. Good vortex at high speed.	Stayed centralised. Good vortex at high speed.
Rare earth oval stirrer bar	Failed to centralise. Tumbles. Poor vortex	Failed to centralise. Tumbles. Poor vortex

The bars were then tested with a flask in each position to see how they would interact with each other, shown in **Table 2**.

**Table 2. Evaluation of stirring bars in a flask in each position.**

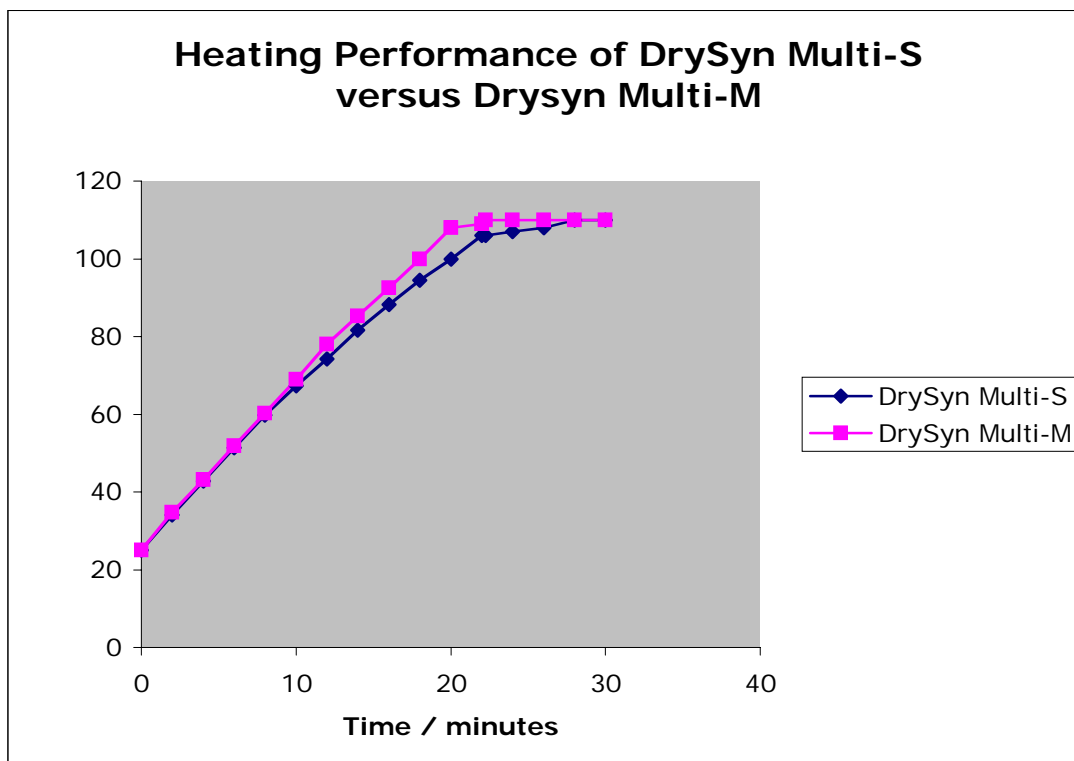
<b>Stirring bar</b>	<b>Evaluation in DrySyn Multi-S (500 ml)</b>	<b>Evaluation in DrySyn Multi-M (250 ml)</b>
3 x plain stirrer bar with pivot ring	Centred well. Tumbles at low speed. Good vortex at high speed before decoupling.	Centred well. Tumbles at low speed. Good vortex at high speed before decoupling.
3 x oval stirrer bar	Centred well. Spins at low - medium speed. Decouples at high speed.	Centred well. Tumbles at low speed. Spins at medium – high speed before decoupling.
3 x rare earth oval stirrer bar	Difficult to centralise. Tumbles at low speed. Spins at medium speed and decouples at high speed.	Difficult to centralise. Tumbles at low - medium speed. Spins at high speed before decoupling

### **Evaluation of heating performance**

The heating performance of the DrySyn Multi-S (500 ml) and DrySyn Multi-M (250 ml) were evaluated using the fuzzy logic temperature controller. The flasks were filled with 100 ml of water and temperature set to 25 °C. The fuzzy logic was then set to 110 °C and temperatures read every 2 minutes. The results can be seen in **Chart 1**.

**Note:** Organic solvents have appreciably lower specific heats and will heat up significantly faster than water used in this evaluation.

Chart 1.



### Conclusion

The DrySyn Multi-S is a fantastic new addition to the Asynt DrySyn range. The DrySyn Multi-S allows the user to perform up to 3 x 500 ml on a single stirrer hotplate unit. The stirring capability of the stirrer hotplate is not greatly affected by the 3-position Multi-S, although some stirrer bars performed better when all 3 positions of the Multi-S were used. The heating performance of the DrySyn Multi-S was very similar to the DrySyn Multi-M, which has been shown to have superior heating capabilities when compared to standard oil baths. The DrySyn Multi-S provides a very efficient means of performing parallel synthesis in a small footprint, and at a very cost effective price. The DrySyn Multi-S and Multi-M allow large-scale parallel synthesis and neatly avoid the mess and safety concerns of oil baths and the cost of multiple stirrer hotplates.