

Trouble free Organometallic Chemistry in Flow with the Vapourtec E-Series

The continuous flow approach offers many attractions for Organometallic Chemistry

- ease of maintaining inert conditions
- control of reaction exotherms
- immediate inline use of unstable reactive intermediate species
- efficient uniform mixing
- reduced handling of potentially pyrophoric reagents
- elimination of temperature gradients and reactor hot spots

Unfortunately, pumping moisture sensitive reagents using syringe pumps or piston pumps provides its own set of challenges. Syringe pumps suffer from wetted surfaces that are repeatedly exposed to air and piston pumps can suffer from accumulation of particles in the valves.

However the revolutionary V-3 pump (as used in the Vapourtec E-Series) pumps organometallic reagents such as BuLi, DIBAL-H and Grignard reagents as easily at water!



The Vapourtec E-Series



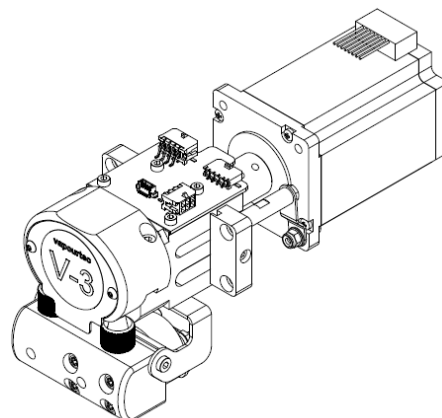
The new Vapourtec V-3 pump

The V-3 Pump

Anyone who has tried to pump organometallic reagents knows that they can present certain challenges, due to their sensitivity to air and moisture.

But these challenges are eliminated with the revolutionary new Vapourtec V-3 pump.

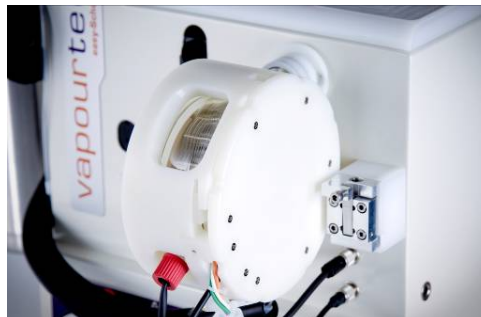
- Based on the peristaltic principle, it can self prime even with pipes initially full of air. The presence of a gas bubbles causes no problems at all.
- Reagents can be fed directly from a bottle with a septum. There is never any need to pressurise reagent bottles.
- The wetted area inside the V-3 pump is small. Drying the pump with anhydrous solvent is simple and rapid.
- The occasional generation of suspended particles of insoluble salts due to small amounts of moisture presents the pumps no problem, as there are no check valves or sliding seals.
- Where a quench is required for a cooled reaction, the E-Series system offers an affordable 3rd pump option. (see overleaf)



Cooled Reactor

The Vapourtec cooled reactor system, originally developed for the high end R-Series system, is available in the same form for the E-Series.

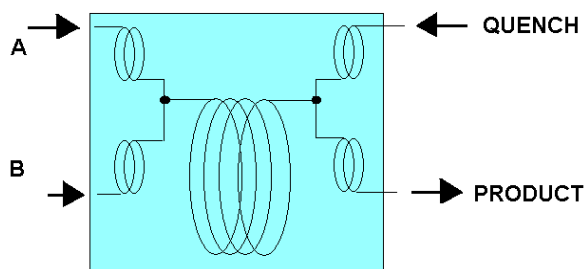
It requires no separate chiller, but offers rapidly achieved reaction setpoint temperature from ambient down to -70°C with reactors sizes up to 10 ml.



The E-Series can accommodate two cooled reactors, each at a different sub ambient temperature.

The Vapourtec cooled tube reactor offers a number of features which make cooled reactions straightforward

- Reagents are pre-cooled before they are mixed so there is no unintended reaction at higher temperatures
- When the reagents do meet, the mixer is also in the cooled area and so an exothermic reaction is controlled and the heat generated is removed
- There is the option to bring an inline quench flow into the cooled area (and pre-cool it) allowing any intermediate formed to be further reacted or to quench excess reagent or by-products.



Cooled reactor internal connections

And the cooling is rapid. From ambient to -70°C in 16 minutes with a 10 ml reactor.

Simple Inert Gas Blanketing of Reagents

Like all new R-Series systems, the E-Series includes a built in low pressure regulator and distribution manifold. A single inert gas supply of up to 8 bar pressure is regulated internally supplying the inert gas precisely controlled to 40 mbar at 4 outlets. The gas is delivered via the supplied tubing and needles directly through the bottle septum allowing reagents to be kept under an inert atmosphere and drawn directly from the reagent bottle.

No more surprisingly porous balloons or complex home made gas distribution systems.



3rd Pump Option

One great attraction of continuous flow for organometallic chemistry is the ability to immediately use unstable products in subsequent reactions, which requires a 3rd reagent pump.

The E-Series is available in both 2 and 3 pump options, and a 2 pump system can be upgraded later by the purchase of an affordable 3rd pump which can be fitted by the user.

