APPLICATION NOTE A085-FP99 - FLOW CONTROL IN MICRO-ENCAPSULATION PROCESS

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BETTER FLOW CONTROL OF MICRO-ENCAPSULATION PROCESS

Micro-encapsulation is an emerging technology to manufacture spherical capsules, ranging from micron to millimeter scale, where a core with an active compound is surrounded by a protective shell. The active compounds in these tiny capsules find their use in food, cosmetics and pharmaceutical applications, such as flavouring agents or enzymes. The shell allows the active compound to be protected against 'hostile' environments during a period at which it should be inactive, and to be released at a specific moment and a specific location upon the action of a selected trigger.



Micro-encapsulation manufacturing processes include spray drying, coating or emulsion technologies. During a conference in the city of Nantes, the start-up company Capsulae met Bronkhorst France, who was able to control the process conditions during the micro-encapsulation manufacturing process in a more direct way.

Application requirements

Many micro-encapsulation manufacturing processes use the inaccurate, indirect way of pressure control or level control to determine the flow of liquids that are necessary to obtain capsules. However, the size of these capsules is rather irregular, and it is hard to control the viscosity and density of the necessary liquids. In order to overcome these issues, a direct way using mass flow control needs to be applied.

Important topics

- Direct flow control instead of indirect pressure or level control
- Very repeatable process, as shown by regular size of capsules
- No time loss and no product loss
- Flexibility of supplying liquids with several viscosities and densities

Process solution

After a demonstration by Bronkhorst France of a liquid dosing system with a Coriolis mass flow instrument and a gear pump as its main components, Capsulae decided to order this combination. In this compact setup, the virtually pulse-free gear pump is close-coupled to the Coriolis mass flow meter (series mini CORI-FLOW M15), where the mass flow device controls the speed of the pump with an adjustable PID-controller.

By using this equipment, Capsulae adds liquids to the micro-encapsulation manufacturing process with high precision flow rate and repeatability to a high extent. This last feature is demonstrated by a low variation in capsule size distribution, i.e. capsules with regular sizes, leading to cost reduction as hardly any product material is being wasted - which is the real added value of the Bronkhorst solution. Moreover, the amount of liquids in the various capsules batches is highly reproducible. The company is able to produce small, medium or large capsules in the micron to millimeter range in a controlled way.

As the equipment enables to change the viscosity and density of the liquids concerned, the flow meter/gear pump combination is a very flexible one. Capsulae is building a new pilot with the objective to supply several liquids at a capacity of up to 10 kilograms per hour using this flexible technology.

Micro-encapsulation is fast growing as an application area, which is demonstrated by a large number of contacts and early-stage projects that Bronkhorst France has with (start-up) companies in this field - some of them based on the Nantes conference, where the Bronkhorst demonstration was highly appreciated. It is envisaged that the combination of a Coriolis mass flow meter and a gear pump can be a solution for 90% of all micro-encapsulation manufacturing processes.

Recommended Products



MINI CORI-FLOW™ M15

Min. flow 0,2…5 kg/h
Max. flow 3…300 kg/h

Pressure rating 100 bar

Independent of fluid properties

High accuracy, fast response

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BRONKHORST (UK) LTD

1 Kings Court

Willie Snaith Road

Newmarket Suffolk CB8 7TG

Tel. +44 1223 833222

sales@bronkhorst.co.uk