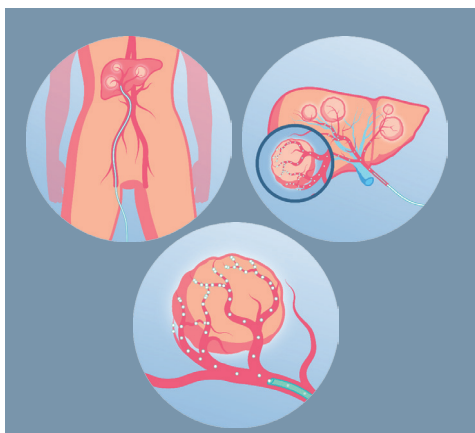


# Microspheres for liver cancer treatment



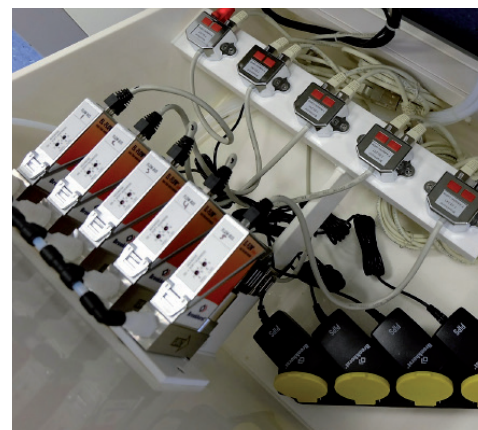
Application note A072-ME01-1216A



**Patients who suffer from liver tumours that cannot be surgically removed nor respond to chemotherapy, may benefit from a local treatment with radioactive particles.**

Quirem Medical manufactures polylactic acid microspheres containing radioactive holmium, suitable for such treatment. These microspheres are injected in the hepatic artery and are carried along by the blood flow. The radioactive microspheres will lodge within the small blood vessels near the liver tumour where they deliver their radiation locally, with the aim to kill the tumour cells. Quirem Medical manufactures the non-radioactive microspheres. Subsequently, the microspheres are enriched by neutron bombardment. An essential step in the synthesis is the controlled evaporation of a solvent that has been used in a previous step. Bronkhorst mass flow controllers deliver the nitrogen flow to enhance and control the solvent evaporation.

◆ Process of injecting radioactive holmium



Bronkhorst setup

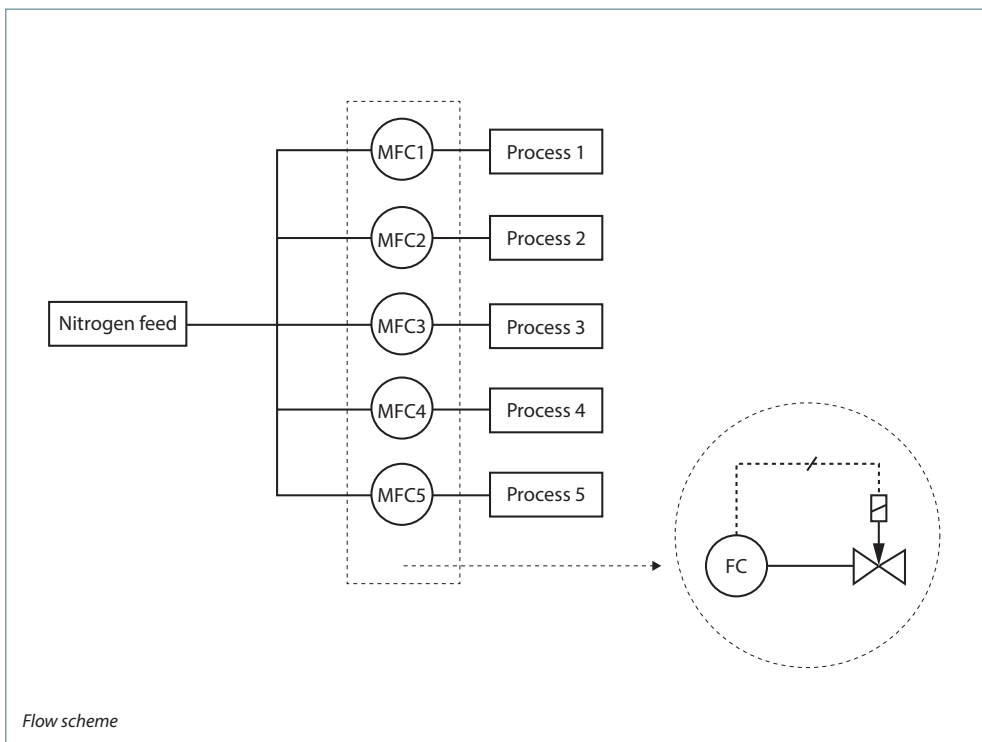
## Application requirements

Nitrogen is needed to evaporate the solvent, as it acts as an inert carrier gas that sweeps off the evaporated solvent and accordingly determines the evaporation rate. So the correct nitrogen flow is a very important parameter in the production process to obtain the right size of the microspheres.

### Important topics

- ◆ Correct & stable nitrogen flow rate
- ◆ Monitoring of process conditions
- ◆ FDA approved seals
- ◆ Cleanroom production

## Process solution



Flow scheme

To evaporate the solvent in the microsphere synthesis, classic type EL-FLOW mass flow controllers are used. There are five batch processes in parallel, each with its own mass flow controller and with a Hepa filter upstream. All of these mass flow controllers have FDA approved seals, to anticipate future use of the product in the USA.

These mass flow controllers were manufactured in the cleanroom, and were double packed and sealed delivered. This delivery included all necessary certifications, including a TSE/BSE declaration to demonstrate that no animal fats have been used in the device. Moreover, Bronkhorst MASS-VIEW has been included, to monitor if the mass flow controllers will deviate in due time, which may be a trigger to send the devices to Bronkhorst for recalibration.

The correct nitrogen flow is a very important parameter in the production process. The scale of the flow is for Quirem Medical more important than its accuracy. Furthermore, a high quality flow controller (and meter) is necessary: to establish a stable flow, and also to be able to monitor the process conditions - for read out and data storage. They are pleased with the mass flow controller, and satisfied with Bronkhorst's fast service. ▶

The currently used flow is very suitable to produce microspheres that are used to treat patients. Perhaps in the future will be investigated if a different nitrogen flow rate results in an improvement of the production process. ■



## Recommended Products



### EL-FLOW Select

EL-FLOW Select Series Mass Flow Meters/Controllers are thermal mass flow meters of modular construction with a 'laboratory style' pc-board housing. Control valves can either be integrally or separately mounted, to measure and control gas flows from lowest range 0,014...0,7 l/min up to highest range 8...1670 l/min.

- ◆ High accuracy (standard 0,5% Rd plus 0,1% FS)
- ◆ Rangeability in digital mode up to 1:187,5
- ◆ Fast response (down to 500 msec), excellent repeatability
- ◆ Optional Multi-Gas / Multi-Range functionality: freely programmable ranges and gas types
- ◆ Pressure ratings 64 / 100 bar (Multi-Gas / Multi-Range functionality up to 10 bar)
- ◆ Compact, modular construction



### MASS-VIEW

The innovative MASS-VIEW® flow meter series are a digital alternative to the conventional VA meters (variable area meters) or rotameters. The MASS-VIEW® series operates on the principle of direct thermal mass flow measurement, for gas flow ranges from the lowest range 0-0,2 l/min up to the highest range 0-200 l/min.

- ◆ Bright, wide-angle OLED display
- ◆ Free of parallax errors
- ◆ Virtually independent of pressure / temperature variations
- ◆ Low pressure drop
- ◆ Wide flow ranges
- ◆ Fast response and high accuracy
- ◆ 4 selectable ranges
- ◆ 10 pre-installed gases available

## Contact information



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A072-ME01-1216A

ME: Medical  
01: Medical Equipment

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