Flow chemistry: analysis of market trends

Sightseeing by skilled flow chemists

KEYWORDS: Flow chemistry, market and regulatory trends, offer width.

Abstract
The recent flow chemistry market, offer, and regulatory trends are displayed in the light of experts comments. Moving demand is pushing the equipment makers to adapt themselves quickly and efficiently leading to an innovative and interactive Innovation.

A MARKET/PERCOLATION MATRIX

The concept of flow chemistry has been promoted for more than one decade now, not only through the organization of specific scientific symposiums, but with an increasing and self-adapting offer of innovative equipments over driving the market at various scales. A need for an up-dated picture of where this technology breakthrough stands, naturally emerged.

To more accurately figure out the current flow chemistry scene, a questionnaire was sent out to both chemical companies and equipment manufacturers. All the participants, with no exception, mentioned a positive trend in the adoption of continuous intensified processes. This trend is more visible since a couple of years.

All markets do not respond the same way. The first segment to taste the flow chemistry was obviously the pharmaceutical industry. The commissioning by GSK at the beginning of this year of a fully continuous process for API manufacturing is the result of a decade of human and technical investments said Andrew Witty, President of GlaxoSmithKline.

Between a third and a half of the company’s current portfolio of drugs could be made using continuous processing... “We see a rather small percentage of processes in flow today but that is certainly increasing.”

In reality, the answer is a sophisticated mixture of chemistries trends, application segments and geographical zones.

Innovative manufacturing techniques for industrial flow reactors, like 3D metal printing (selective laser melting) recently developed by Ehrfeld Mikrotechnik BTS within the INVITE programs, are being discussed.

The “hood factory”, consisting of placing the reactive equipment near the target market, is a perfect example of the flow offer. This strategy has been pushed by companies like Ehrfeld Mikrotechnik BTS within the INVITE programs. This strategy has been pushed by companies like Ehrfeld Mikrotechnik BTS within the INVITE programs.
Several technologies that will allow us to isolate our products in a continuous fashion, outputting particles with chemical and physical attributes tightly controlled.

Dirk Kirschneck, Managing Director of Microinnova Engineering® is adding: “In the last two years we have done more and more activities in downstream processing like crystallization and extraction as well as in continuous liquid formulation. Furthermore we realized a high demand of modular flow systems which can deal with different types of technologies including one for high viscosities and for continuous processing of solids.”

However the market is still working in a conservative way and breaking the pattern is possible only with the increase of successful number of installations in continuous and time, as any “disruptive” technology adoption in conservative market confirms Alessandra Vizza Abrili, Regional Commercial Manager EMEA & NSA Corning Reactor Technologies, at Corning SAS.

The percolation of continuous processes on the traditionally batch set industrial grounds remains challenging, but positive signs are now definitively on. Cultural changes, growing demand, regulatory pushes, need for more eco-efficient processes, and after agility are now paving the way to a bright flow chemistry spread out.

A trend is emerging which is seen in the market which is represented in the graph below. The graph is showing how the technology push and market pull are influencing the flow chemistry market trends. The graph is divided into two main sections, one for technology push and one for market pull. The technology push section is represented by the left side of the graph, while the market pull section is represented by the right side.

FUTURE TRENDS

Few barriers are however regularly mentioned. When it comes to regulatory affairs, and especially for the pharmaceuticals sector, flow is certainly challenging a batch minded community.

However, the learning curve is now playing in favor of continuous processes. In April this year, the continuous production of Janssen HIV drug Prezista® at their Porto Rico Gurabo site was greenlighted by the FDA, which is encouraging other pharmaceutical companies to engage similar moves.

Pharmaceutical companies, or CMO working for the pharmaceutical sector, like Novartis, Eli Lilly, AstraZeneca, SK Chemicals... are more and more presenting achievements on continuous processes at various Flow Chemistry Symposia.

Another concern is the switch to continuous for the downstream steps.

Andrea Adamo from Zaiput Flow Technologies says: “We think the landscape of equipment offer is quite populated, especially in terms of reactor units. We hope our in line work-up technology will experience wider adoption and lead to higher level of process integrations. Probably more solutions are needed in some aspects of downstream processing”.

But here again, the technology is evolving quickly to fill the existing gaps.

Nuno Matos, Head of Continuous Manufacturing at Hovione, said: “We are optimistic that in the next 5 years important technology developments will occur allowing to extend to other unit operations what was already achieved with flow reaction. For instance, at Hovione, besides Spray-Drying, we are currently testing and developing several technologies that will allow us to isolate our products in a continuous fashion, outputting particles with chemical and physical attributes tightly controlled”.

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