

PRODUCT SCALING

A cost or an investment?

Any idea is good on paper. Turning it into reality is often another thing.

In the specific case of chemical reactions, the idea on paper can be only made real in a laboratory. In this environment, new products are produced mainly in chemical flasks or small chemical reactors. Once you have empirical evidence that the reaction works, the following actions must be performed:

- Modifications
- Optimizations
- Analyses
- Cost calculations
- Security assessments

However, the ultimate objective is not only producing a new product in a lab, but selling it, and for this it is necessary to produce it in large quantities using large reactors. At this point new challenges begin.

Moving the process directly from laboratory scale to industrial scale is daring to say the least. Success is highly unlikely, not to mention the dangerous situations that may be produced.

What works well on a small scale does not necessarily work well on a large scale. Everything must be tested first.

There are different strategies which can be used to scale up safely and efficiently, in order to anticipate as many problems as possible and avoid them.

There are computational models that predict the behaviour of the system which can help to propose hypothetical scenarios. However, the most common options, whether combined with computer models or not, are test beds and pilot plants. Sometimes, it is also necessary to introduce a semi-industrial scale.

But what is a pilot plant?

Pilot plants are facilities similar to industrial plants, but smaller in size. However, the more similar the materials, equipment and technologies are, the more reliable will be the results obtained. Thus, the easier it will be to scale up.

And what are pilot plants for?

Pilot plants help to determine the feasibility of the process. With the design and execution of the tests, all process parameters are adjusted and optimised, especially the physicochemical and purely technical variables that change as production volume increases.



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In addition, they help to assess whether the final installations are ready to carry out the process or whether modifications are needed.

Do pilot plants have any other advantages?

Another advantage of pilot plants is that it allows the production of sufficiently large quantities of products so the customer can also perform their own pilot tests.

They also allow the safer evaluation of new technologies, materials and control systems.

Moreover, in evaluating and optimising the technical aspects of the process, more representative results than those from the lab are obtained. For example:

- Handling of raw materials and products
- Product quality
- Production costs
- Waste and how to manage it
- Energy consumption and its optimisation
- Process safety and critical point detection

In short, testing in pilot plants allows the laying of the foundations of the industrial process.

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