



## **A retrofit strategy to achieve “Fast, Flexible, Future (F3)” pharmaceutical production processes**

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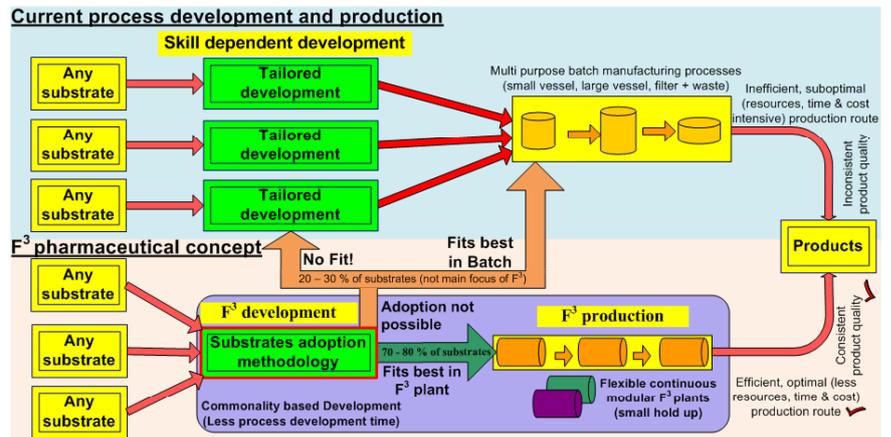
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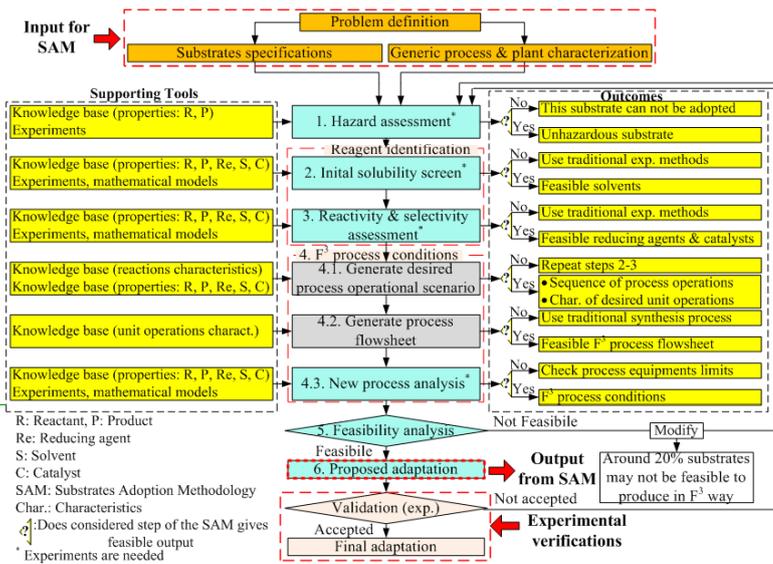
**Introduction:** A “Substrates Adoption Methodology (SAM)” and a generic nitro reduction process-plant template for a series of substrates with similar molecular functionality has been developed. The main idea is to combine the flexibility of batch processes with the efficiency of continuous processes.

**SAM identifies changes to a process-plant template:**

- ❖ Reagents (e.g. reducing agent, solvent, catalyst)
- ❖ Process equipment configuration
- ❖ Process operational conditions (e.g. T, P, F)



## Substrates Adoption Methodology (SAM)

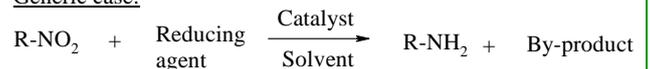


## Nitro reduction case study

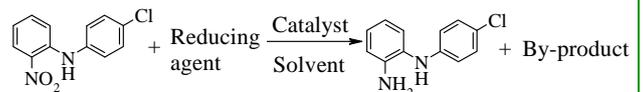
Amines are used in many pharmaceutical products and therefore make a good target for a generic process.

**Problem definition:** Adapt a generic nitro reduction process-plant template for the adoption of 2-Nitro-4'-chlorodiphenylamine

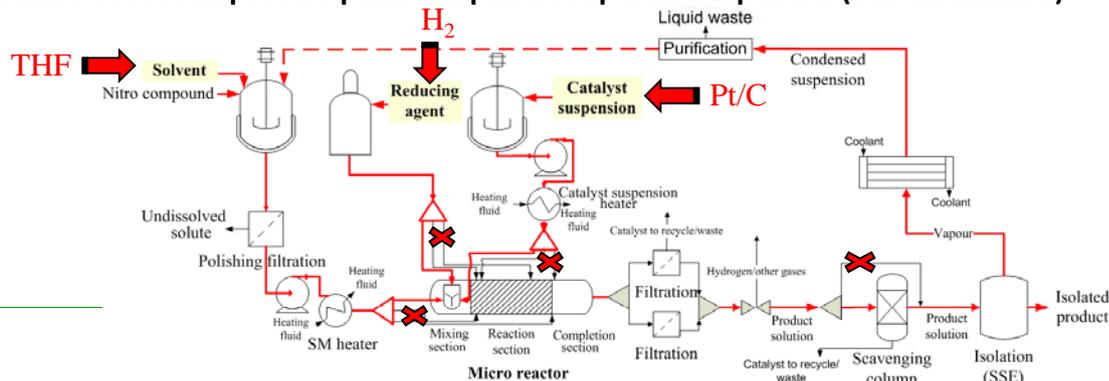
**Generic case:**



**Specific case:**



## Generic nitro reduction process-plant template: Proposed adaptation (one alternative)



**Conclusions:** A generic nitro reduction **Process-Plant template** and **Substrates Adoption Methodology (SAM)** including the supporting tools (knowledge base, model library, graphical tool (operational window), solubility prediction and solvent selection tool) has been developed to achieve a flexible and fast production process.

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