

# Development of a Multi-step Continuous Flow Synthesis of Zidovudine

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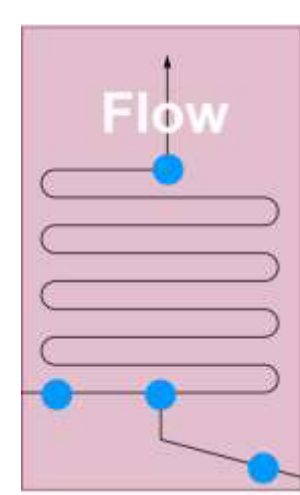
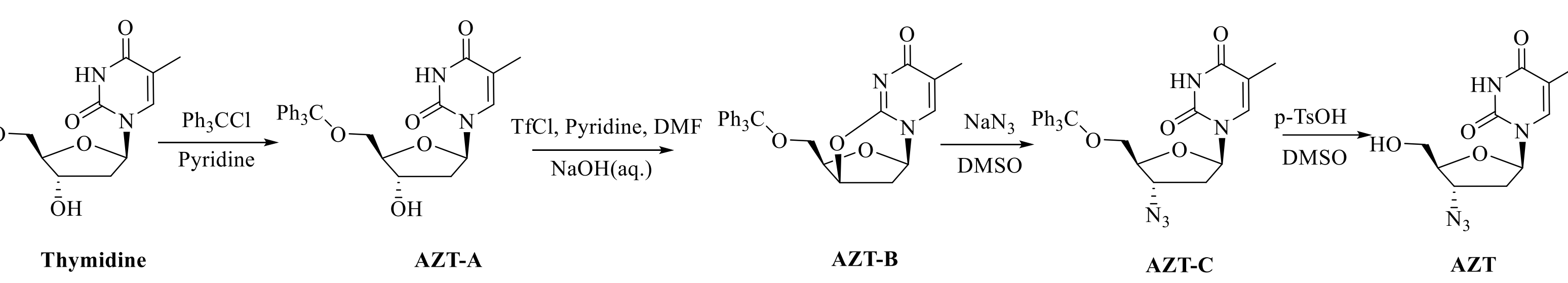
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## Introduction

The deadliest epidemic of our time is AIDS. Globally, there were approximately 1.3 million new HIV infections and 630,000 AIDS-related deaths in 2023.<sup>1</sup>

Zidovudine is the world's first anti-AIDS drug approved by the US FDA as well as a first-line treatment drug for HIV.

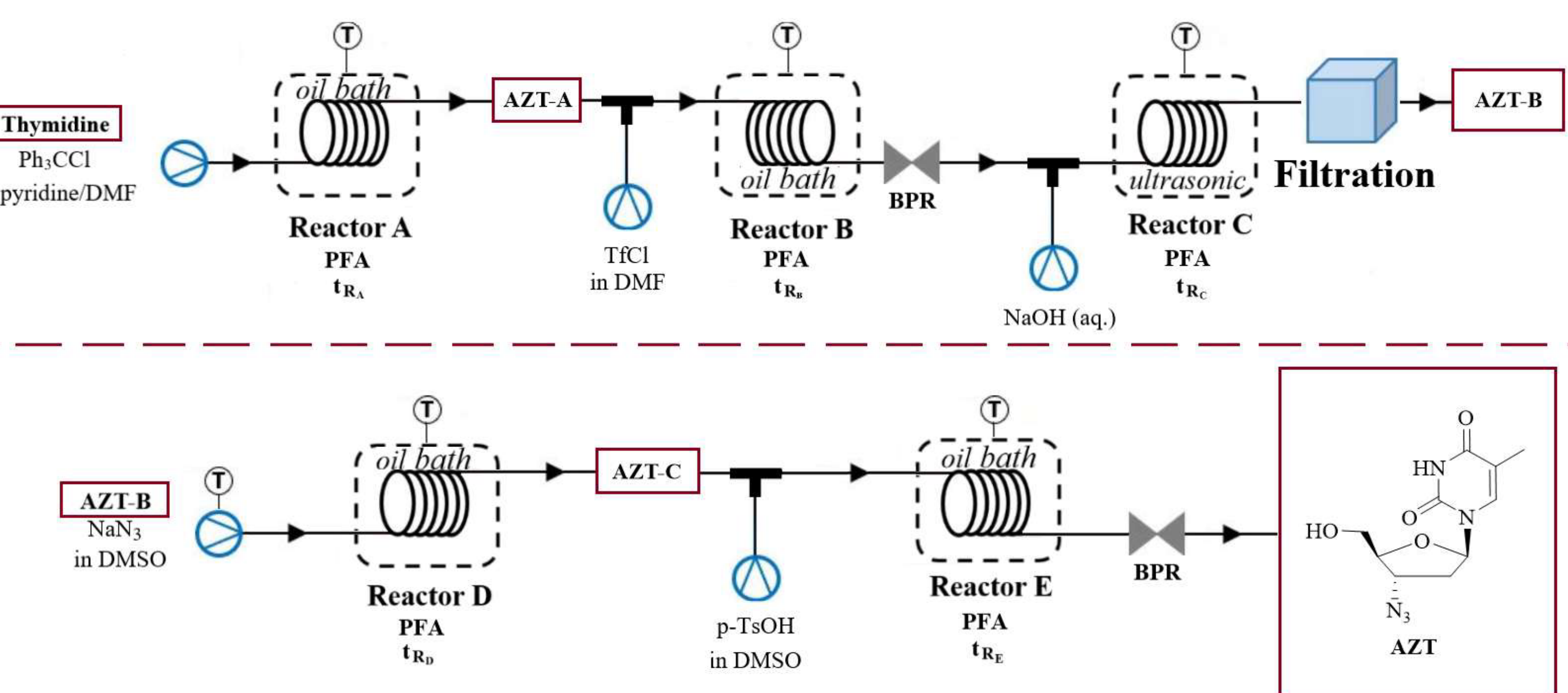


- Poor reaction safety (*azidation*)
- Long reaction time
- Low reaction efficiency
- ...
- Improved safety
- Constant reaction parameters
- Facile automation
- ...

✓ **Efficient, flexible, and on-demand production of Zidovudine**

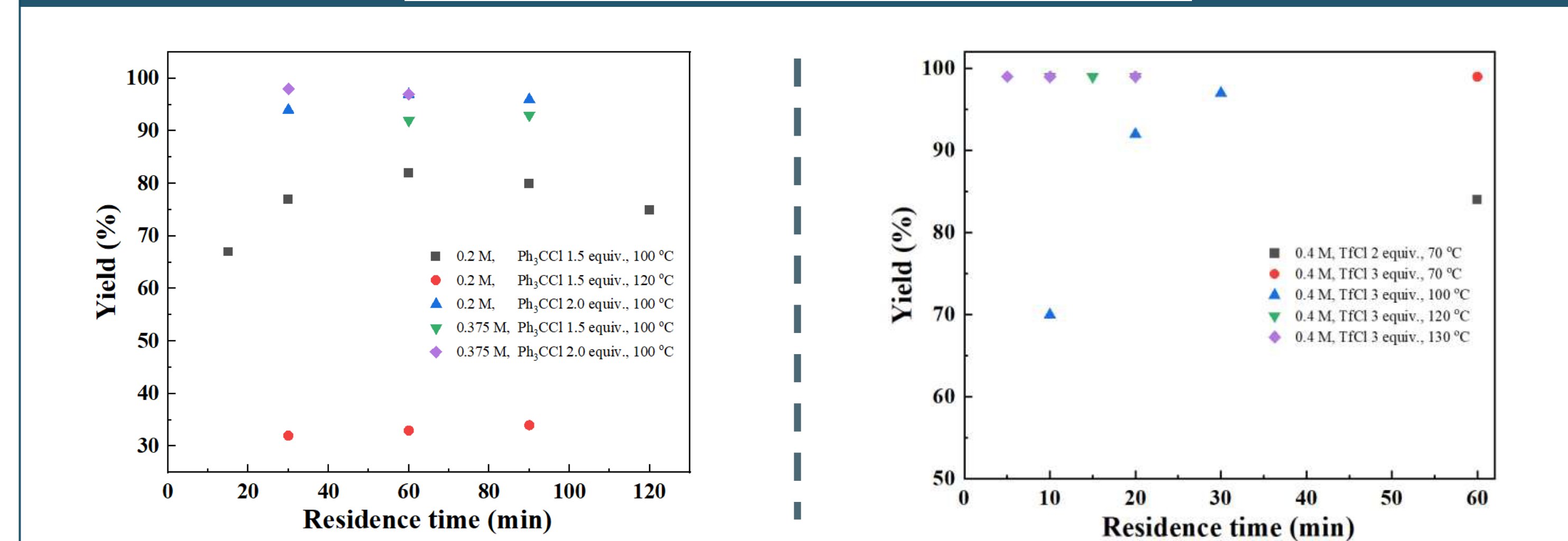
## Methods

### Continuous flow synthesis

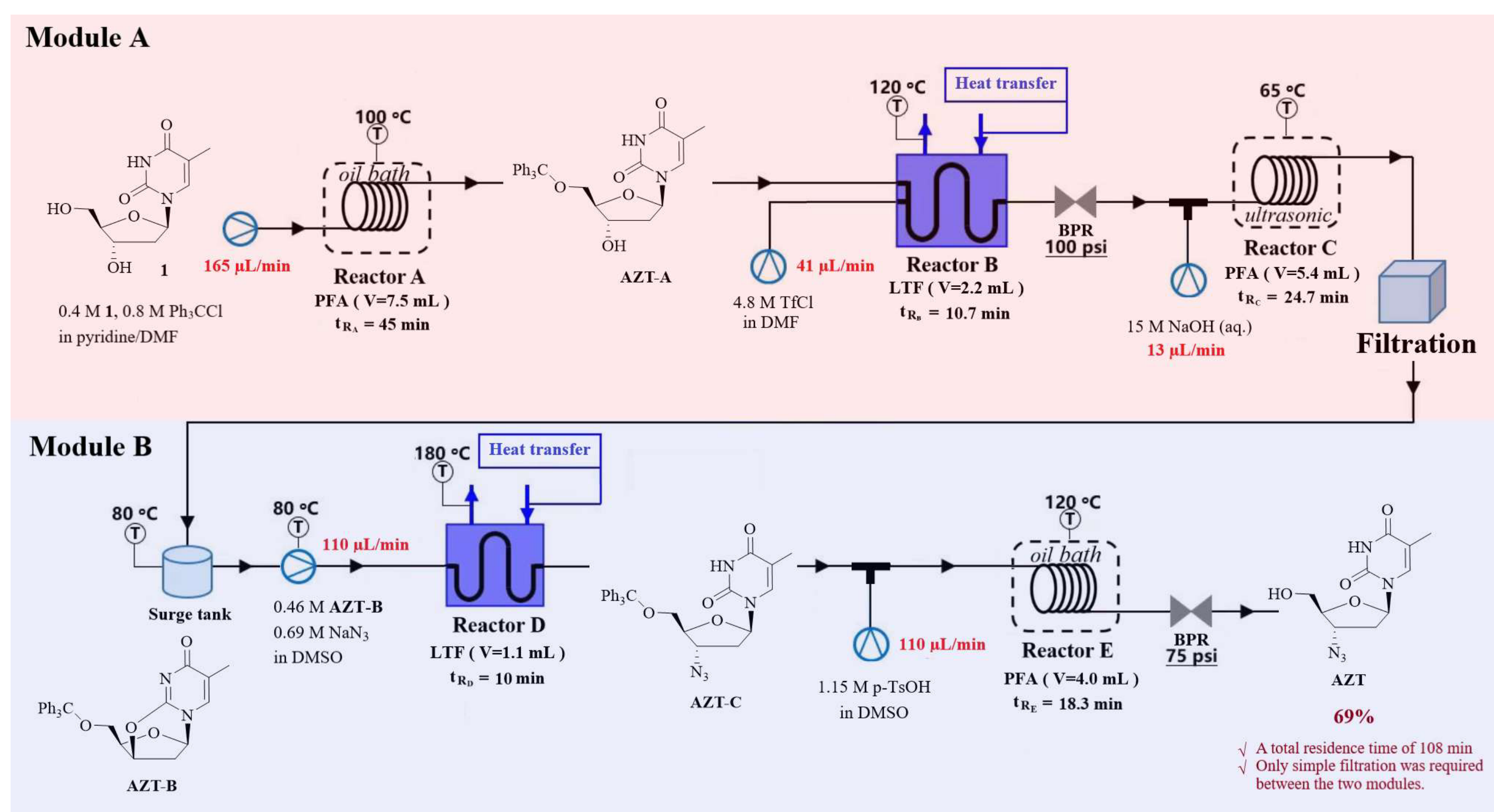
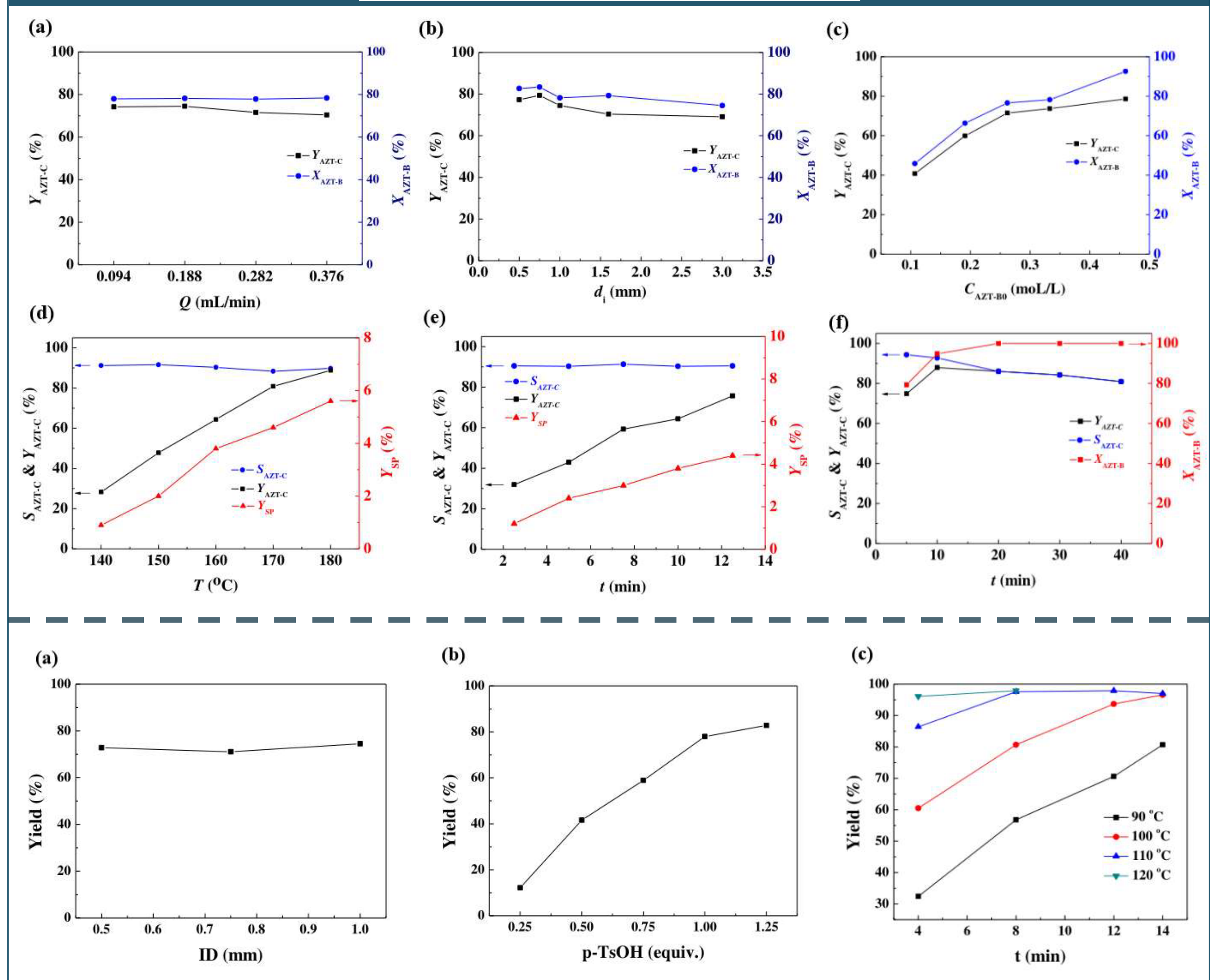


## Results

### Thymidine → AZT-A → AZT-B



### AZT-B → AZT-C → AZT



## Conclusions and Prospects

- ✓ Under the optimized conditions, **the total yield was 69%** with **a total residence time of 108 min**.
- ✓ Compared with batch process, the new process shortened the reaction time (42.5 h in batch) and improved the safety and efficiency.

- Incorporating **Process Analytical Technologies** into continuous flow processes (e.g., FlowIR, in-line UV-vis, online HPLC...)
- Automated system
- Integrated platform

