Beijing Dilun Biotechnology Co., Ltd.
Specializes in R&D and manufacturing of peptide synthesis equipment, providing comprehensive technical solutions and services.
Web: www.peptidescientific.com. Email: chengchao.wei@dilunbio.com

Comparative Study on Three Synthesis Routes for Antiviral Peptide RC-12

1.Research Background

Antiviral peptides possess low drug resistance and excellent biosafety, emerging as promising candidates for novel antiviral medicines. Traditional solid-phase peptide synthesis (SPPS) dominates mainstream peptide production, yet the heterogeneous reaction system requires excessive amino acid and solvent input, leading to high raw material cost, abundant three-waste discharge and relatively low crude product yield. To solve these industrial drawbacks, two recyclable hydrophobic carrier-assisted liquid-phase synthesis routes (Tag-OH & BDK-OH) have been developed as alternative production technologies. The research takes classic antiviral peptide RC-12 as the research object to compare the three preparation processes comprehensively.

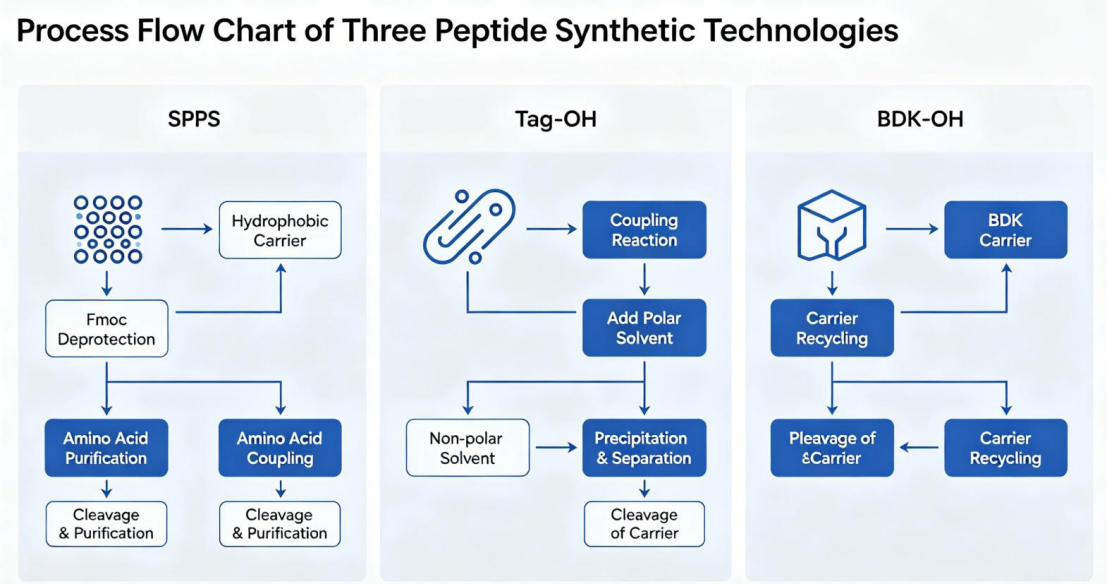
2.Research Purpose and Significance

The study completes RC-12 preparation via SPPS, Tag-OH liquid-phase and BDK-OH liquid-phase three routes separately, systematically indexes total yield, raw material consumption and waste generation of each

process. The comparative data verifies the economic and environmental advantages of hydrophobic tag liquid-phase technology, provides reliable process reference for industrial scale-up production of antiviral and similar polypeptide drugs, guides enterprises to select cost-effective green production scheme.

3.Research Content

SPPS adopts insoluble CTC resin as solid carrier, relies on repeated deprotection and coupling cycles, but non-homogeneous reaction cannot implement real-time TLC monitoring; its final crude yield only reaches 48.96%, accompanied by massive consumption of amino acids and DMF solvent plus large-volume waste liquid emission.



Tag-OH and BDK-OH belong to homogeneous liquid-phase synthesis with recyclable hydrophobic carriers: carriers dissolve well in nonpolar solvent but precipitate out after adding polar solvent, enabling simple separation via filtration without complicated column purification. Tag-OH

uses long alkyl benzene alcohol carrier, finished RC crude yield hits 65.24%, carrier recycling rate reaches 58.28%, with the lowest raw material dosage and waste output among three routes. BDK-OH depends on diphenyl ketone-based phosphorous carrier, product yield is 62.23%, close to Tag-OH, but consumes more various organic solvents and generates more waste than Tag-OH technology. Mass spectrum detection confirms target RC-12 obtained from three methods meets consistent molecular weight standard.

4.Conclusion & Outlook

Both Tag-OH and BDK liquid-phase synthesis outperform traditional SPPS in yield, raw material utilization and environmental protection level, with reusable carriers complying with green manufacturing concepts; among them, Tag-OH route features lower solvent consumption, fewer waste emissions and superior comprehensive cost performance, showing prominent industrialization potential for antiviral peptide production. Going forward, researchers will further optimize carrier synthesis cost and recovery efficiency, expand the application scope of Tag-OH process to more long-chain and difficult-sequence therapeutic peptides, continuously upgrade liquid-phase synthesis system to replace part of traditional solid-phase production lines and lower overall industrial peptide manufacturing costs.