

Peptide Synthesis for the 21st Century



GAPPeptides™

GAP Peptide Synthesis

From Flask to Reactor: Scalable and Economical

GAP Peptides, LLC's recent scaleup research suggests Group-Assisted Purification Peptide Synthesis (GAP-PS) offers significant cost savings over traditional synthetic peptide chemistry. GAP-PS cuts raw material COGS in half, increases throughput, and utilizes sustainable, environmentally friendly solvents and reagents. Easily adaptable for large-scale efforts, GAP-PS might just revitalize competitiveness for contract R&D and manufacturing services companies that lost market share when API production was outsourced to locations with lower manufacturing costs.

Manufacturing Costs Drive Innovation

As technological advances make synthetic routes more viable and applications for synthetic peptides increase across life sciences, interest in peptide products continues to grow. Another constant is the challenge of eroding margins faced by manufacturers vying to grow business in a highly competitive market. Cost is not only a factor in determining optimal synthesis route; it also can be critical in determining who wins the project that might lead to the next blockbuster. In fact, a recent global study completed by Informa Connect Life Sciences revealed that peptide cost of goods sold (CoGS) ranks second in importance for industry professionals facing the challenges of development of new therapeutics.

Sponsors of peptide-based products consistently seek out innovative technologies to address and optimize synthesis route challenges. Responding to this need, GAP Peptides, LLC (GAPP) is commercializing a new method of peptide synthesis which lowers CoGS and supports easy scale-up as products move from the benchtop to the plant. GAPP's economic advantage is in its method's productivity: getting more output from a given process is a proven strategy to reduce cost and improve margins.

Comparative analysis: GAP Peptide Synthesis (GAP-PS) vs. Solid Phase Peptide Synthesis (SPPS)

Using detailed metrics for SPPS recently published by one of the world's largest independent contract manufacturers, the team at GAPP performed a high-level comparison between GAP-PS and SPPS to assess relative raw material usage and potential cost savings. Material costs were evaluated on a per-Kg basis for an example 5-mer peptide in multiple areas including but not limited to: GAP anchor vs. SPPS resin, solvents, amino acids, and coupling / deprotection reagents.



The highly efficient and scalable GAP-PS process achieves solubility control over the growing peptide by the attachment of an intelligently designed small-molecule GAP protecting group to a substrate of interest.

The analysis revealed GAP-PS raw material costs on the 5-mer target compared quite favorably to SPPS. The largest cost saving was found by replacing the SPPS resin with the small-molecule anchor used in GAP-PS. The analysis also showed that the second-largest cost saving resulted from highly efficient use of solvent in GAP-PS. Reduction in solvent consumption by using GAP-PS was also the largest con-

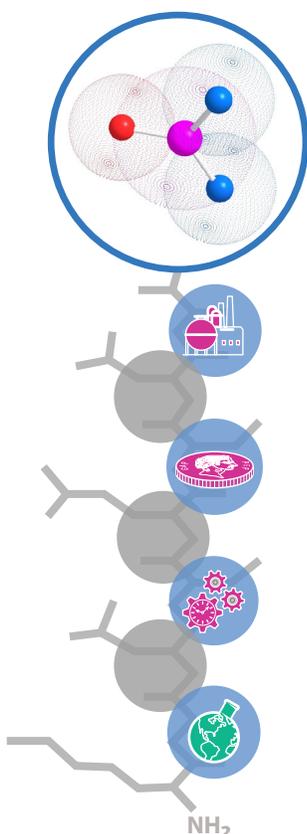
tributor to the overall reduction in the organic waste stream. On the example target, GAP-PS could reduce estimated anchor costs by >80%, while reducing estimated solvent consumption by >80% and solvent costs by >40%. When looking at all the contributing factors in the example, GAPP concluded it had the potential to reduce total raw material costs by an estimated 48%.

of high crude purity, possible reduction of chromatographic purification times, use of green, environmentally friendly chemistry, and improvements in product throughput. GAPP technology could have a significant positive impact on manufacture of synthetic peptides.

Closing the GAPS in cost-efficient synthesis strategy

To remain competitive, peptide manufacturers must produce high-quality products, using sustainable, cost-effective methods that improve margins. This brief analysis illustrates only a small portion of the benefits offered by GAP-PS. Other potential benefits include delivery

GAP Peptide Synthesis: 4 Advantages Over Solid-Phase Synthesis



GAP Anchor Molecule

Enables liquid phase synthesis and Group Assisted Purification

Scalable

Homogenous GAP-PS chemistry does not require specialized reactors or equipment.

Economical

GAP-PS reduces material costs by 50%, while improving peptide yield over SPPS.

Efficient

GAP-PS increases reaction efficiency and delivers high crude purity.

Green

GAP-PS uses green chemistry, reduces solvent waste by 80%, and enables recycling.

To learn more about GAP Peptides' research and collaborative approach to licensing GAPPs technology, visit our website at www.GAPPeptides.com or email Dr. Cole Seifert at cseifert@gappeptides.com