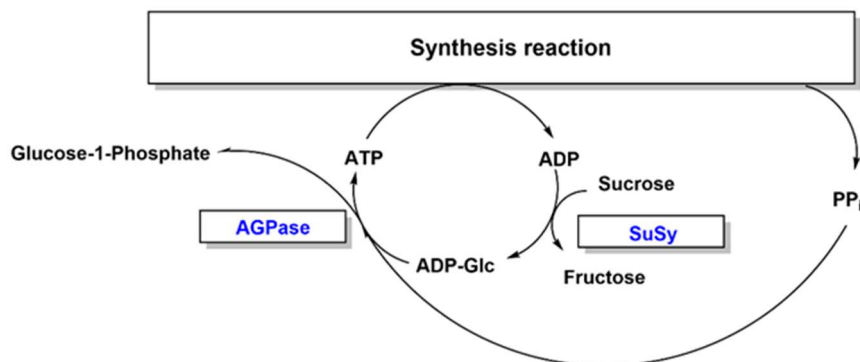


RWTH Technology

Procedure for a phosphate-free ATP-regeneration from sucrose and pyrophosphate



AGPase: ADP-Glucose Pyrophosphorylase

SuSy: Sucrose Synthase

Challenge

Adenosine triphosphate (ATP) is a broadly used co-factor for the synthesis of fine chemicals, pharmaceuticals, and biopolymers by biotransformation and biocatalysis. Since high concentrations of ATP and its by-product adenosine diphosphate (ADP) limit many biocatalytic processes, ATP regeneration is applied. This reduces the concentration and the overall amount of ATP and saves costs. In addition, labor- and cost-intensive product purification and unstable phosphate donors limit actual ATP-regeneration systems.

Solution

Our procedure uses the energy-rich compounds pyrophosphate (PP_i) and sucrose to generate ATP from ADP. For that, the enzyme Sucrose Synthase synthesizes adenosine diphosphate-glucose (ADP-Glc) and fructose from ADP and sucrose. The enzyme ADP-Glucose Pyrophosphorylase processes ADP-Glc and PP_i to generate ATP and glucose-1-phosphate. PP_i is not added to the reaction, but can be used by every PP_i generating reaction.

Advantages

- regeneration system based on low-cost feedstock
- PP_i is directly recycled in the process
- ATP-dependent enzyme cascades are stoichiometrically phosphate-free
- Simplified product purification

Status

- Patent status: International patent application pending and German patent application pending.
- Development status: Proof of concept AND progressive R&D

RWTH Aachen University offers a cooperation partner with many years of expertise in glycobiotechnology and biocatalysis and is looking for industrial partners (SMEs) for further patent exploitation and product development or research partners (industry or university) for joint R&D collaborations.

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Fields of application
Biotechnology

Keywords

#ATP-Regeneration;
#Phosphate free
#Enzyme cascades;
#Synthesis;
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