

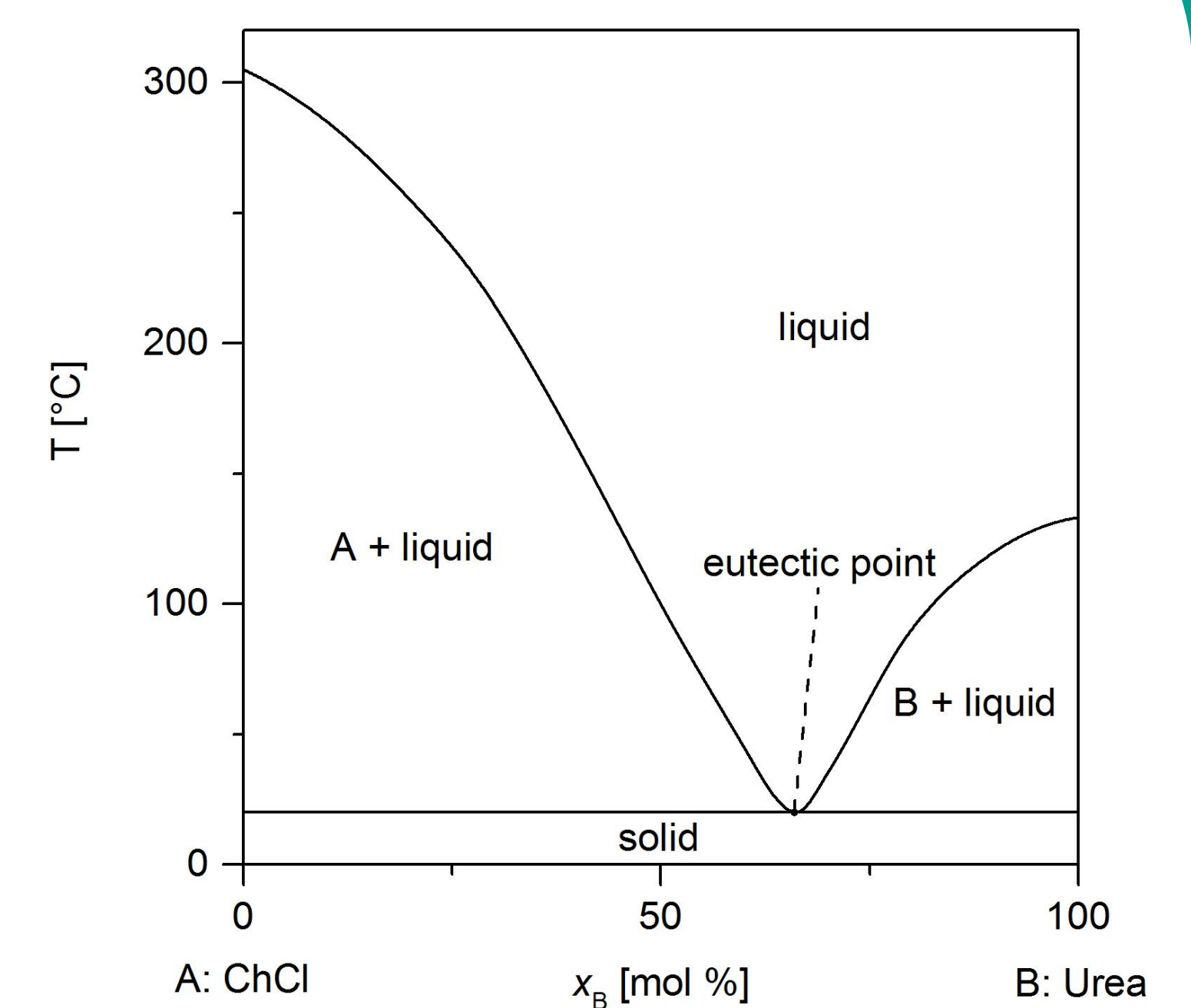
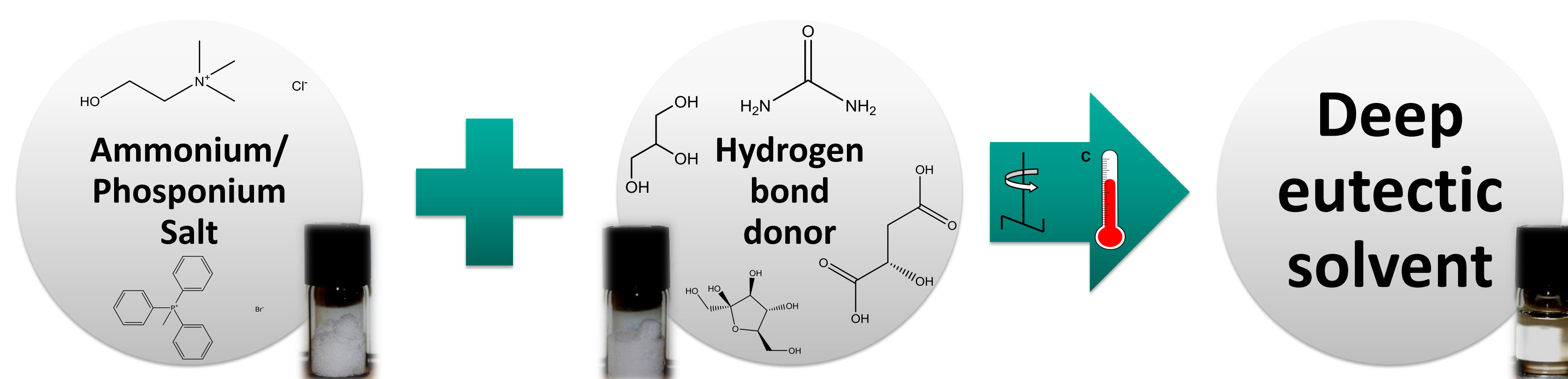
Evaluation of Deep Eutectic Solvents as Reaction Media for Biotransformation

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What is a Deep Eutectic Solvent?

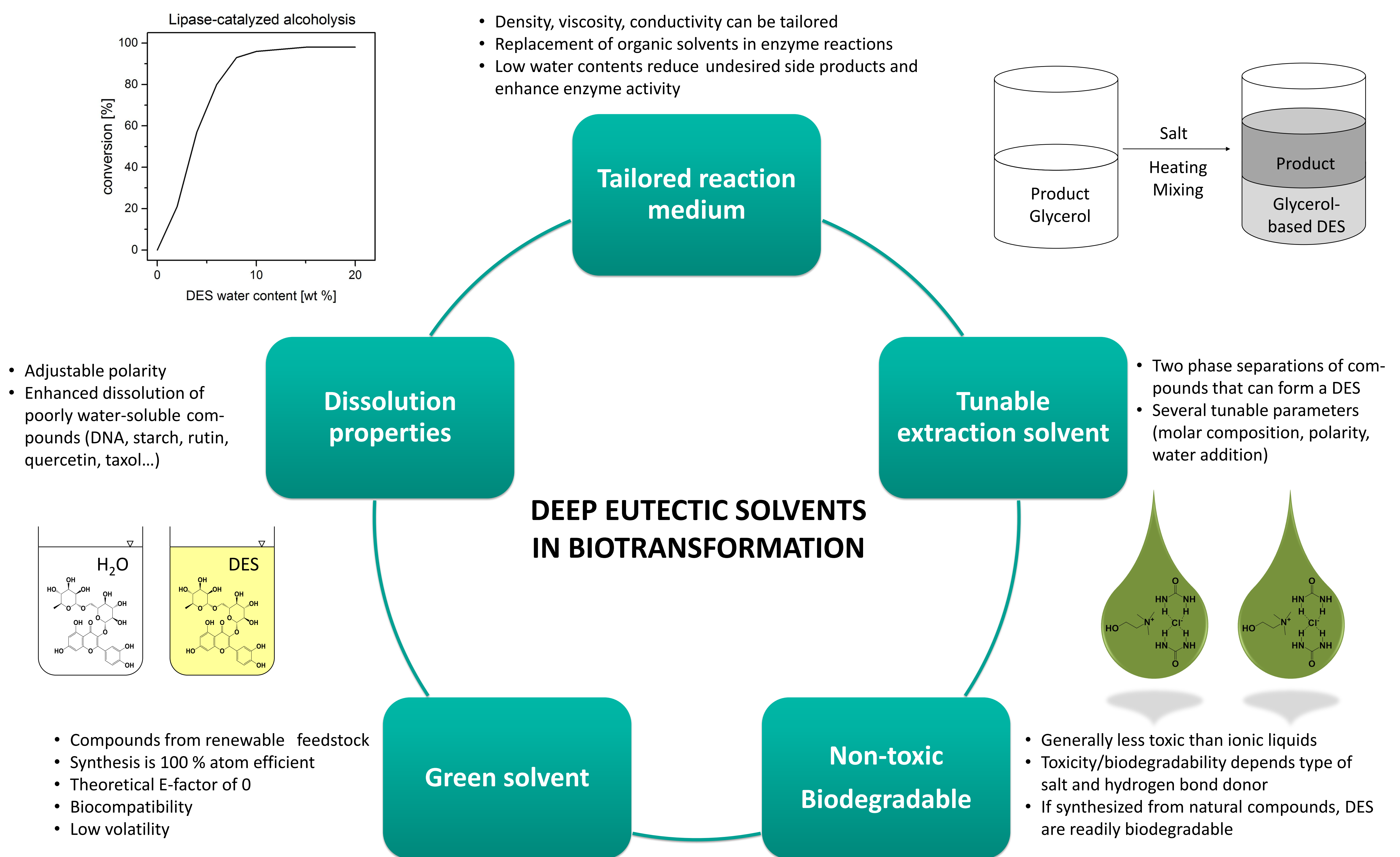
Deep eutectic solvents (DES) are typically composed of a **quaternary ammonium salt** (e.g. choline chloride) or a phosphonium-based salt mixed with a **hydrogen bond donor** (e.g. amines, amides, alcohols, carboxylic acids, sugars and polyols) in a certain molar ratio. The components are most commonly heated and stirred to form a clear, often viscous liquid. DES are characterized by having a considerably lower freezing point as each of their individual components. The relatively **large depression of the freezing point** is caused by the interaction of the salt anion and the hydrogen bond donor molecule forming a hydrogen bond network.



Schematic binary phase diagram.

Deep Eutectic Solvents Feature Interesting Properties for Biotransformation Tasks

Having emerged as a new type of ionic liquid in the early 2000s, DES are considered as **potential "green" solvents** and have been studied as alternative solvents for various applications like dissolution/separation tasks, in organic synthesis or as electrolytic solutions. Beyond that, DES may also be utilized in biotransformation as **reaction media** and their application has been mostly investigated in terms of **lipase-catalyzed reactions**, such as transesterifications. Interestingly, DES containing small quantities of water are able to promote enzyme stability and activity, although some of the individual DES compounds (e.g. urea) are known to have protein denaturing effects.



DES can be utilized as a versatile platform solvent for various applications in biotransformation facilitating a novel and "greener" process design.