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FORMATION OF LIESEGANG RINGS FROM ORGANIC SUBSTANCES COMPLEX

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Melamine-based supramolecular chemistry is one of the most interesting that utilizes a 'bottom-up' and 'right-left' helical approach to fabricate fascinating Nano-to-Micro scaled morphological architectures. At present work we combine supramolecular system and periodic precipitation to absorb L-arabinose from solution and to form a complex pattern in gel.

Liesegang Rings are a phenomena seen in many chemical systems undergoing a precipitation reaction under certain concentration range, the absence of convection and diffusion limitation. For example, when one of reagents is dissolved in a gel medium, laminar flow and mixing are precluded, diffusion limitation is achieved. Upon pouring another reagent that form weakly soluble salt with the reagent in gel, rings are produced. Melamine cyanurate provides absorption of organic molecules from the solution. We created system saturated with L-arabinose by two different means. First method is based on creation of stock solution of melamine and L-arabinose. We used a dilute solution of melamine and L-arabinose in agar gel in two different setups – Petri dish or tube. To form Liesegang rings we fill it up with solution of cyanuric and barbituric acids. Second method was to add high concentration of electrolyte that influence pattern formation negatively, for example – buffer for bacteria. In such case we grow pure melamine-cyanurate rings in gel, and after that pour buffered solution of L-arabinose on the top of the gel and let it to dry at the ambient conditions. Using different concentrations or volumes we can get different concentrations in gel.

The experiment generally is concentrated on self-organized Liesegang ring structures with absorbed L-arabinose. The goal of the work is providing method for encapsulating organic chemical components into melamine cyanurate structure. L-arabinose is a convenient substance for preliminary study since it is used together with bacteria, which became fluorescent upon eating L-arabinose.

In our work we used melamine cyanurate formed in agar gel and studied the mechanism and kinetics of the formation of such structures based on Liesegang ring phenomena. Thus, they behave Matalon-Packter low: the higher concentrations, the closer rings occur.

In summary, we achieved that really interesting self-recording model by inter-diffusing the reacting species of high concentrated cyanuric acid in melamine agar gel and measure a geometric series of the band.