

I wonder how GCB can be used for micro-gravity experiments?

GCB can be used for micro-gravity experiments as a passive reactor, without any moving part or crew manipulation.

The method is simple:

To perform micro-gravity experiments one always has to supply the reactors a few hours before the launch time. Let us call this time the waiting time for launching. After take-off, there is a time required to reach the orbit around the Earth and (for the case of the International Space Station) to be locked to the ISS and to locate the reactor in the proper place. Let us call this time the waiting time for orbiting.

Taking into account the above considerations, you prepare the GCB and punch the capillaries into the gel with a depth x such that:

$$x > (D \cdot t)^{1/2}$$

where D is the diffusion coefficient of the precipitating agent and the waiting time for launching plus the waiting time for orbit. As a result, during the waiting times for launching and orbiting, the Earth, the precipitating agent will reach the protein solution filling the capillaries and the crystallization will take place in gel-free solution under diffusion controlled mass transport.

Because of the restrictions of volume and mass in the space orbiter, one of the major drawbacks to crystallize macromolecules in space is the reduced number of reactors which precludes screening of crystallization conditions. If we consider that it is possible to place 39 GCB (234 capillaries) in a volume of 10x10x10 cm³ with a mass of about 1 kilogram (solutions and gels included), GCB is a simple and inexpensive device to be used in space crystallization.