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Constraining the prebiotic cell size limits in extremely hostile UV environments: Implications for the Early Earth

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The potential of organic vesicles to harbor a population of an elemental chemical replicator in an extremely hostile UV environment is considered. In this case, the vesicle acts as an effective shield against the harmful effects of the UV radiation, whereas in the external medium, the molecules of the replicator are readily destroyed. According to our results, replicators in the vesicle only exist when the radius exceeds some critical value Rc being, in general, a function of the internal parameters of the system. The viability of chemical replicators in a hostile radiative environment could be relevant to understand the origin of the first primitive cells on the early Earth and the ulterior development of life in our planet.

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