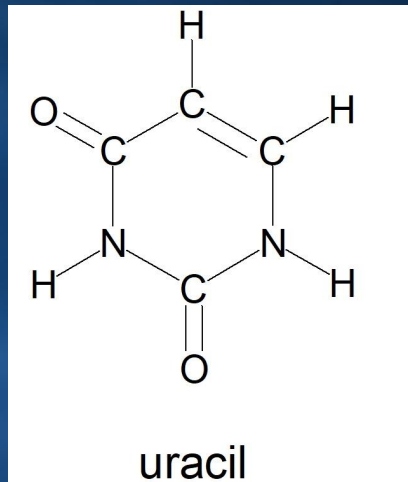


# Radiolytic Destruction of Uracil in Solar System Ices

Can biomarkers survive radiation exposure?

**Uracil is one of the four RNA nucleobases and a component of meteoritic organics. If delivered to the early Earth, uracil could have been involved in the origins of the first RNA-based life. If so, this molecule could be a biomarker on other worlds, if it can survive cosmic radiation exposure.**

Europa



- Scientists measured uracil's destruction rate in ice samples exposed to irradiation by protons that simulate planetary magnetospheric radiation and the Solar wind.
- At Europa-like temperatures, results show a more rapid destruction in ices dominated by CO<sub>2</sub> than in ices dominated by H<sub>2</sub>O (see table).

• Results from this study can be used to determine whether this important biomarker could survive in icy planetary environments and, if so, where future missions can look for their best chances of finding it.

Uracil on Europa	Half-life in H <sub>2</sub> O	Half-life in CO <sub>2</sub>
At surface	2 months	30 days
Depth of 1 cm	140 years	73 years
Depth of 1 m	830,000 years	450,000 years