

Transformation and sublimation of interstellar ices: insights from laboratory experiments and astronomical observations De Carvalho Santos, J.

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## Propositions

accompanying the thesis

## Transformation and sublimation of interstellar ices

Insights from laboratory experiments and astronomical observations

- 1. Interstellar ice formation does not always follow intuitive pathways (Chapter 2).
- 2. HS radicals are powerful triggers of a rich sulfur ice chemistry (Chapters 4, 6 & 7).
- 3. Accurate snowline predictions require accounting for both diffusion and desorption (Chapter 5).
- 4. Gas-phase observations of sublimated ices can reveal both the presence of less abundant species and help trace their formation histories (Chapter 8).
- 5. Operating ultrahigh vacuum systems is largely about opening and closing valves in the correct sequence—the true challenge lies in the design and interpretation, not in the experiment itself.
- 6. Astrochemistry demands fluency in both astronomy and chemistry; focusing on one while neglecting the other limits one's habilities to conduct meaningful research.
- 7. The laboratory pursuit to produce ever-more complex molecules *ad infinitum* in prestellar ices may be fueled more by wishful thinking than empirical value—and risks veering into scientific complacency.
- 8. Unequivocally detecting biosignatures in exoplanet atmospheres and confidently interpreting them as evidence of life likely remains beyond the reach of current technical capabilities.
- 9. Respect begins within; waiting for others to grant it only cedes them control.
- 10. To be just is to uphold merit as the highest ideal, while recognizing that true meritocracy is an illusion.
- 11. A scientist who does not apply critical thinking beyond their own research is unfit to bear the responsibilities of the profession.
- 12. Patience and Time may be the strongest warriors, but only when fueled by a tenacious heart can they triumph.

Julia Santos Leiden, 2 July 2025