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A song of ice and gas: the formation and evolution of complex organic molecules

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Citation

Chen, Y. (2026, February 24). *A song of ice and gas: the formation and evolution of complex organic molecules*. Retrieved from <https://hdl.handle.net/1887/4292644>

Version: Publisher's Version

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Propositions
accompanying the thesis

A Song of Ice and Gas

The formation and evolution of complex organic molecules

1. The physical differentiation between low- and high-mass protostars does not necessarily lead to chemical differentiation of complex organic molecules. (*Chapter 2*)
2. Large complex organic molecules can be abundant if they have certain functional groups. (*Chapter 3*)
3. Both inheritance and reprocessing can be responsible for shaping the chemistry during star formation. (*Chapter 4*)
4. Systematic measurement of peak wavelength and width of absorption bands is a powerful tool for identifying the contributing species and their mixing environments. (*Chapter 5*)
5. The explosive growth of spectral observations of interstellar molecules calls for more powerful fitting tools that can handle line blending and uncertainty estimation automatically.
6. Manual inspection is more reliable and interpretable than machine-learning algorithms when the data volume is limited.
7. Weak spectral features can contain rich science, but are also prone to misinterpretation.
8. Facing the staggering oversubscription rates of ALMA and JWST, it is better to focus on crafting one or two high-quality proposals rather than taking a shotgun approach.
9. It is harder but more fulfilling to take on a challenge than to circumvent it.
10. Good science rests on honesty and patience, while scientific success depends more on ambition and pragmatism.
11. For those accustomed to rich food cultures, a long and exclusive contract with a terrible canteen vendor is the no.1 enemy of academic productivity.
12. Studying abroad, especially in a distinct cultural context, is not just about academics; it is about breaking down and rebuilding one's life and worldview.

Yuan Chen
Leiden, 24 Feb 2026