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## From midplane to planets : the chemical fingerprint of a disk

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From Midplane to Planets  
The Chemical Fingerprint of a Disk

1. Chemical reactions in gas and ice in a protoplanetary disk midplane change the molecular composition of this material over time, if the disk is sufficiently ionised. *(Chapter 2 and 3)*
2. Simulating chemical evolution with thousands of reactions can reveal general chemical trends that can be used to improve the treatment of chemistry in planet formation models. *(Chapter 3)*
3. A primordial origin remains the best explanation to the presence of abundant O<sub>2</sub> ice in comets 1P and 67P. *(Chapter 4)*
4. Formation locations and times for Solar System comets can be constrained by comparing to chemical evolution models. *(Chapter 5)*
5. Although the circular polarisation signal from *chlorophyll a* in plant leaves measured in the lab is weak, it should not discourage the astronomical community from considering this signal as a possible biosignature.  
*Patty et al. 2017, arXiv e-prints 1701.01297*
6. The continued study of disintegrating rocky exoplanet may reveal the first signs of extinct life, even before living life is detected.  
*see e.g., Ridden-Harper et al. 2016, A&A, 593A, 129R*
7. Detecting life on exoplanets may or may not be eminent, but continuing to discuss and refine the definition(s) of good biosignatures, and how to observe them, is important for astronomy.
8. A scientific talk delivering an interesting story around a small bite of your research is often better than to deliver all your ideas and results.
9. Early career researchers should receive priority for contributed talk slots at conferences.
10. Scientists should continuously strive to become better teachers and communicators, and spending time and resources communicating, and improving as a communicator, should be acknowledged as parts of the job as a scientist.
11. The value of, not just coffee, but good coffee, should not be underestimated.
12. Exercise involving constantly varied, high intensity, functional movements can be excellent for clearing your head, improving your physique and health, and getting through a PhD.
13. Even though the Dutch are excellent at English, as a foreigner you will get much closer to the Dutch and their culture, if you make an effort to speak, write and understand Dutch.
14. Just as there are no borders on the sky, we must strive to not put any borders between each other.