ASTROCHEMISTRY – A MOLECULAR APPROACH

ASTR657

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The first organizational meeting will be in Bilger Hall, Room 212, Tuesday, August 23, 10:30 am. Agenda: class schedule (regular lectures vs. block lectures) and topics

OVERVIEW (1 block)

1. elements and molecules in the Interstellar Medium
2. overview of interstellar environments
3. molecules in interstellar environments I: gas phase
4. molecules in interstellar environments II: ices

GAS PHASE PROCESSES (1.5 blocks)

5. characteristics of a chemical reaction
6. energetics of a chemical reaction
7. direct versus indirect reactions; barriers versus barrier-less
8. collision theory gas phase
9. reaction classes in interstellar and planetary chemistry
10. experimental studies of neutral-neutral reactions
11. experimental studies of ion-neutral reactions
12. retro-synthesis Gas Phase Chemistry

SOLID STATE REACTIONS (1.5 blocks)

13. thermal reactions on interstellar grains
14. suprathermal versus thermal rate constants
15. collision theory solid state (MARLOWE vs. CASINO)
16. retro-synthesis solid state chemistry
17. experimental studies of charged particle irradiations

APPLICATIONS (2 blocks)

18. isotopic enrichments in ISM, comets, and planetary atmospheres
19. charged particle processing of interstellar ices
20. charged particle processing of solar system ices (KBOs, icy satellites, comets)
21. charged particle processing of minerals: carbonates & silicates
22. gas phase chemistry in planetary atmospheres (Mars, Titan, Gas Planets)