

# Complex forming reactions at the low temperatures of interstellar medium: from statistical to statistical methods

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The molecular complexity in the interstellar medium increases in cold molecular clouds, at approximately 10 K. It is then important to establish the reactivation rate constants in chemical networks taking place in gas phase, as alternative to those taking place on cosmic ices. At 10 K, quantum effects, such as tunneling and zero point energies are very important. Complex forming reactions are particularly challenging, because they involve the formation of long lived complexes which are difficult to treat with dynamical methods. In this talk I will briefly present some recent results obtained using statistical methods, quantum/adiabatic statistical approach [1] or capture/RRKM method [2], and dynamical methods, such as Ring Polymer Molecular Dynamics for reactions presenting relatively shallow wells and barriers [3]. In this last case, the role of dimers between reactants formed at low temperatures will be also described [4], as an alternative explanation for the fast increase of the reaction rates with decreasing temperature measured in CRESU experiments for a large variety of organic molecules with OH radical.

## References

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**Author:** RONCERO, Octavio (Instituto de Física Fundamental (CSIC) Serrano 123, 28006 Madrid (Spain))

**Presenter:** RONCERO, Octavio (Instituto de Física Fundamental (CSIC) Serrano 123, 28006 Madrid (Spain))

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