Chemical Evolution Of Molecular Clouds

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Molecular abundances of the interstellar clouds are believed to be directly related with those of the Pre-Solar systems, because the pre- solar systems are formed through gravitational contaction of the interstellar clouds. We made extensive molecular spectral line surveys toward a typical dark cloud, TMC-1, and a huge molecular cloud in the Galactic Center, SgrB2, to derive precise molecular abundances of the clouds, and to study chemical evolution of molecular clouds. The frequency ranges observed were 8 - 50 GHz for TMC-1 and 30 - 270 GHz for SgrB2. The results toward TMC-1 represent a typical molecular abundaces in an early phase of the gravitational contraction, and those toward SgrB2 show abundances after stars formed inside. In TMC- 1 we found that there are a lot of unsaturared species, such as long carbon-chain molecules, while saturated molecules were found very rich toward SgrB2(N), one of our observed position in the SgrB2 cloud where a massive star has just formed. Toward SgrB2(N) we detected CH_3OH, C_2H_5OH, CH_3COOH, NH_2CHO, NH_2CN, etc., which are interesting pre-biological species. The formation of these saturated molecules seem to be related with reactions on the dust grains. We also checked the existence of the simplest amino acid, glycine, but the signals from glycine have intensities lower than our detection limit.