temperatures below 500 °C in several active tectonic settings. Biogeochemically, the process is important because it leads to reduction of H_2O to H_2. At the same time, catalytically active compounds such as magnetite are formed. H_2 may be used together with CO_2 and magnetite as a catalyst in Fischer–Tropsch Type (FTT) reactions. FTT processes may lead to the formation of CH_4 as well as heavier hydrocarbons and other abiotic organic compounds. Serpentinization at temperatures below 300 °C is associated with high pH (pH 10–12). It is possible that the high pH may promote the formose reaction in natural environments and the abiotic formation of pentoses such as ribose, the carbohydrate constituent of RNA. Pentoses, and ribose in particular, are stabilized by borate that is scavenged from seawater by brucite – magnesium hydroxide that is yet another product of serpentinization reactions.

Origin of homochirality in an early peptide world

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Life on Earth has chosen one of two possible chiral forms: amino acids left handed, and sugars right handed. Life may very well have been the other way around, and maybe it is actually the other way for some alien life forms still to be discovered. In our talk we review various approaches to achieving full homochirality, focusing mainly on the polycondensation of peptides but also addressing the polycondensation of polynucleotides. In the latter, autocatalysis and enantiomeric cross-inhibition play key roles[1,2], whilst in the former activation and epimerization are crucial[3]. The latter possibility may have been more relevant for the prebiotic chemistry on the early Earth, either in the porous structures in hydrothermal vents or in drying and wetting beach scenarios. This scenario may also be more readily amenable to laboratory investigations. The model captures effects similar to autocatalysis and enantiomeric cross-inhibition without, however, producing unreactive 'waste' product[4]. Finally, the spreading of chirality on the early Earth is discussed by solving a set of reaction-diffusion equations based on a polymerization model. It is found that effective mixing of the early oceans is necessary to reach the present homochiral[5].

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Photolysis of mixtures of gases containing cyanoacetylene or cyanubutadiyne

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Nitriles and particularly unsaturated nitriles play a determining role in Astrobiology. Cyanoacetylene **1** ($H{-}C{\equiv}C{-}C{\equiv}N$) has been observed in the atmosphere of Titan, in comae, in the Interstellar Medium (IM) and in numerous lab simulations of Planetary Atmospheres. The first cyanopolyyne, cyanobutadiyne **2** ($H{-}C{\equiv}C{-}C{\equiv}C{-}C{\equiv}N$), has been detected in the IM and in lab simulations of the atmospheres of Titan and the Primitive Earth. Several approaches leading to mixtures of products have been reported to detect it and to record its spectra[1–3]. We have recently reported the first preparative synthesis of cyanobutadiyne **2**[4]. The photolysis of compounds **1** and **2** could have played a very important role in the formation of many compounds in the IM, in comae or planetary atmospheres including the Primitive Earth. The photolysis of cyanoacetylene by itself or with various other gases has been reported[5,6]. Tricyanobenzenes and tetracyanocyclooctatetraenes have been obtained as well as the corresponding 1,4-adduct or diadduct with ammonia, phosphine (PH_3), silane (SiH_4), H_2S, alkynes or alkenes. Performing the same photolysis in gaseous phase with cyanobutadiyne **2** instead of cyanoacetylene **1**, we have never been able to detect an adduct except with thiols. Even if the vapour pressure of cyanobutadiyne **2** is low at room temperature, very small quantities of vinylic or aromatic compounds can be easily detected by ^1H NMR spectroscopy. Similarly, the kinetic instability of cyanobutadiyne, which is much more important than the one of cyanoacetylene **1**, cannot be proposed as an explanation, cyanobutadiyne being still easily observed in all the photolyzed samples.

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3-Amino-2-propenenitrile

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Cyanoacetylene has been observed in the Interstellar Medium, in comae, in Titan and in many simulations of planetary atmospheres. The presence of ammonia on the Primitive Earth has been the subject of strong debates. However, many compounds postulated as precursors or building blocks (α-aminonitriles, aminoacids etc.) easily give ammonia on hydrolysis or heating. Cyanoacetylene quickly and easily reacts with ammonia to form 3-amino-2-propenitrile in very good yields. In the area of Exobiologie, studies on 3-amino-2-propenitrile have been dramatically underinvestigated. We have developed a quite general study on the chemistry of 3-amino-2-propenenitrile[1–3]. We demonstrated particular properties on the chemistry, acidity and basicity in gas phase of this compound[2]. On the hypothesis that this compound could be formed in the IM or planetary atmospheres, we recorded its gas-phase infrared[1] and microwave spectra[3] to allow its detection in planetary atmospheres or in the Interstellar Medium.

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Effects of Fe (II) in the formation of biomolecules in simulations experiments using spark discharges and aqueous aerosols

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The emergence of life is one of the most puzzling scientific problems. In this context, it has been proposed that aerosols played a major role on the origin of life on the Archean Earth. On the other hand, it is postulated that ancient sea had a salinity of 1.5 to 2 times the modern value, a pH = 5–10 and the presence of the banded iron formations show that dissolved iron was present in excessive quantities in the early Earth. Our experimental approach to synthesize abiotically organic molecules with biological interest consist in the simulation of an aqueous aerosol