# Inflence of redox environment on UV organic synthesis

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UV synthesis of organic compounds in atmosphere of Earth-like planet is important for origins of life. Prebiotic synthesis experiments have suggested that $CO_2$ atmosphere is oxidizing and thus unfavorable for organic synthesis compared to more reducing conditions. However, it is still poorly understand how the wide range of redox environemt affects production of organic compounds. The redox state is not only controlled by chemistry of atmosphere but also buffered by ocean chemistry including Fe(Ⅱ) or other metal ions from hydrothermal input. We have conducted UV synthesis experiments of C-H-O systems under various redox condition with a presence of liquid water for simulating ocean-atmosphere system. The results of our experiment showed that formaldehyde, acetaldehyde, formate, acetate, propionate, and normal alkanes are synthesized under CO- and $CH_4$-bearing atomosphere, whereas all these compounds are not detectable undeer $CO_2$-atmopshere. Nonetheless, formaldehyde, formate, acetate is formed even when the gas phase is pure $CO_2$ when liquid-phase contains Fe(II). When irradiating UV under the presence of Fe(Ⅱ)-bearing water, the production rate of formate is about three times faster than the $CO_2$-$H_2O$ system with 10 times smaller Fe(Ⅱ)-bearing water. These results suggest that the production rate and speciation of organic matter depends on the availability of $H_2O$ as well as total redox state of the whole atmosphere and ocean system. Based on the results, we have modeled the reaction pathway and estimate the flux of each organic compounds supplied to early ocean with considering redox state and UV flux of the earth.