

ATOMIC STRUCTURAL TEMPLATES OF THE EARLIEST LIFE ON EARTH: VIBRATION AND LIGHTNING EXPERIMENTS WITH QUARTZ AND AMINO ACIDS

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Abstract

The atomic structure of minerals and organic molecules is remarkably similar. In particular, between minerals and amino acids, which are the building blocks of life on Earth. The hypothesis tested here is the possibility of energy transfer from minerals to amino acids, in the form of solar energy. The experiments tested the theory that the brighter intensity of light in the early Earth may have kick-started the chemical reactions needed for life. The scenario under investigation is that of light reacting with quartz sand grains exposed at the surface. The quartz grains contain water within the pore spaces, which has basic amino acid structures within in. The experiments determined that the vibration of piezoelectric quartz altered the structure of amino acid molecules.

1. Introduction

The atomic structure of some organic molecules and mineral chains is remarkably similar (Fig. 1) (Pawlikowski 1995, Pawlikowski, Palka-Zielińska 2000). This has led to recent investigations into how the earliest organic life formed on Earth. Most of them is devoted organic compounds (Miller, Stanley 1953 Oparin 1953, Cairns-Smith 1982, Orgel 1994, Muller 1995 Robertson et al 1995).

2. Methodology

Experiments were performed to assess the alternation of amino acid structures by vibrating piezoelectric quartz. The experiments consisted of two phases:

2.1. PHASE I

Plates of piezoelectric quartz of various thickness (therefore different vibration frequencies) were excited using a specially prepared generator. The quartz plates were coated with gold, and a small window on the surface of the plates was coated with various

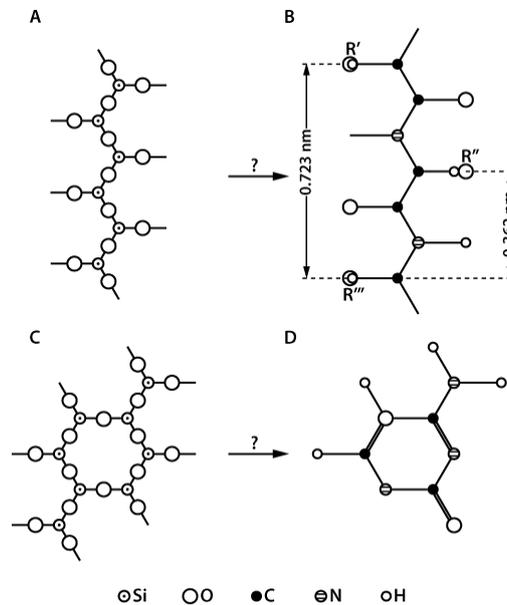


Figure 1. Similarity of selected mineral and organic structures
 A – the structure of chain silicate (Bolewski 1965), B – structure of peptide chain (Lasek 1978),
 C – structure of layered silicate (Bolewski 1965), D – structure of cytosine,
 one of most important DNA component (Jerzmanowski 1994)

amino acids. The optical axis of the quartz plates are shown in Fig. 2. The plates were recorded on an infrared spectrophotometer under the following parameters: Bio-Rad-Win-IR. Two IR analyses of amino acids were obtained, the first when the quartz plate was still, the analysis when the plate was vibrated (Fig. 3, 4).

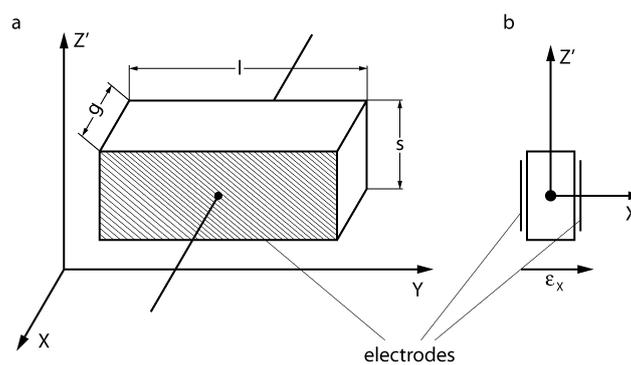


Figure 2. Optical axis of quartz plates used in phase I experiments.
 a – Z', Y, X – optical axes, s, l, b – parameters of plate,
 ϵ_1 – frequency of plate vibration (which is a function of the thickness of plate)

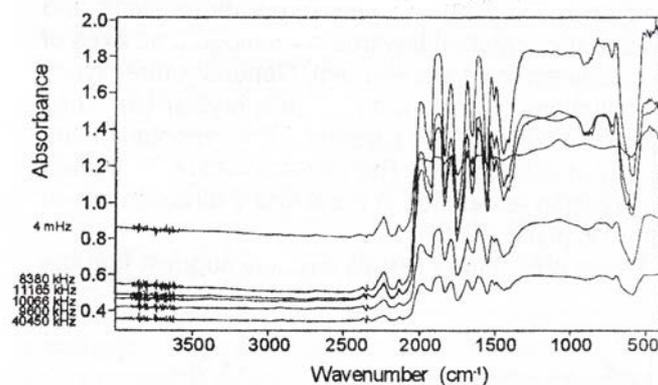


Figure 3. IR curves of aspartic acid on quartz plates, vibrating under various frequencies

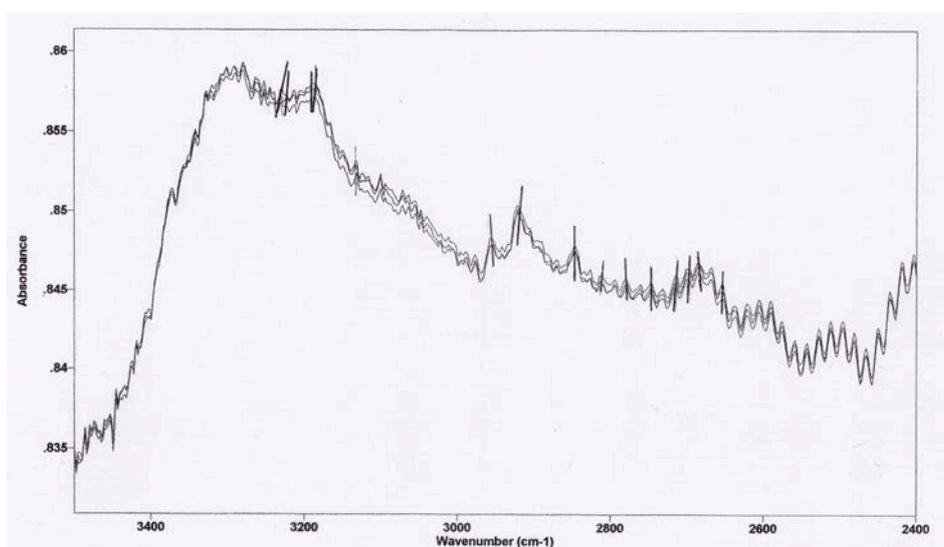


Figure 4. IR curves of aspartic acid on quartz plates.
The lower curve is still (not vibrating), the upper is vibrating, at a frequency of 8580 kHz. The position of the absorption peak changes during vibration

2.2. PHASE II:

This experiment was performed with quartz, artificially created lightning and amino acids dissolved in H₂O (4% liquids). The lightning generator was specially constructed for these experiments (Fig. 5, 6). It houses a rotating container within which was placed a mixture of crushed pure quartz (Fig. 7) and a liquid solution of amino acids (uracil, glycine, glutamic acid, alanine, L-alanine, L-tryptophan, DL-arginine). The surface of

the quartz and amino acid mixture was struck by artificial lightning (at about 50 kV – Fig. 8.). Two IR curves of amino acids were obtained, the first with no lightning, the second after the mixture was activated by artificial lightning (Fig. 9A, B).



Figure 5. Apparatus used for Phase II experiments

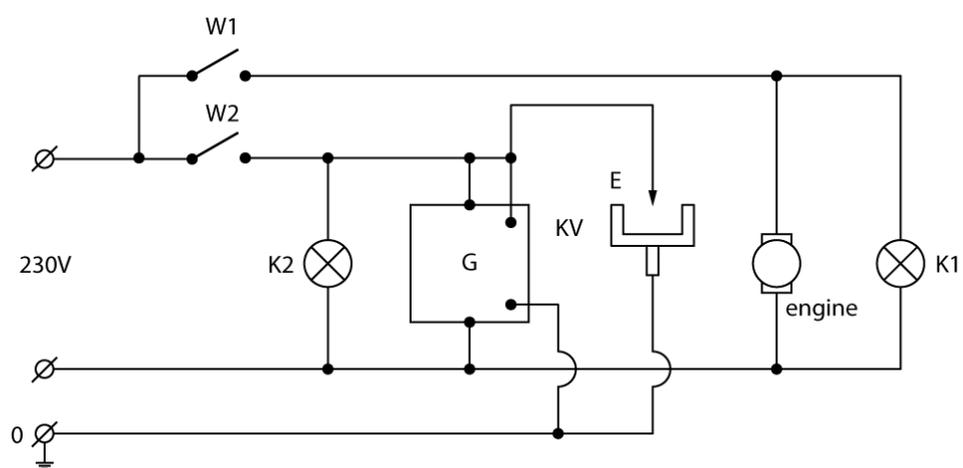


Figure 6. Setup of Phase II experimental apparatus.
W1 – connector for the reacting container engine. **W2** – connector of charge (about 50, 000 V),
K1, K2 – control lights. **E** – electrode. **KV** – reacting container

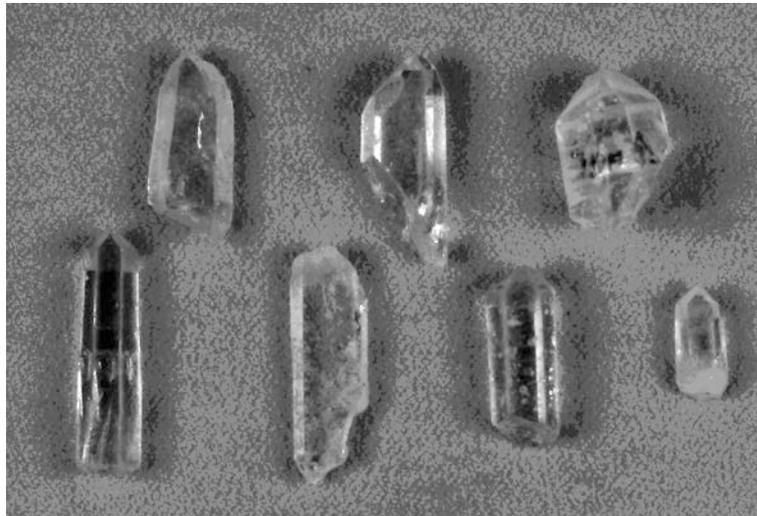


Figure 7. Quartz crystals used in Phase II experiments (from Jegłowa – outcrop near Strzegom – Lower Silesia). Scale 1:1

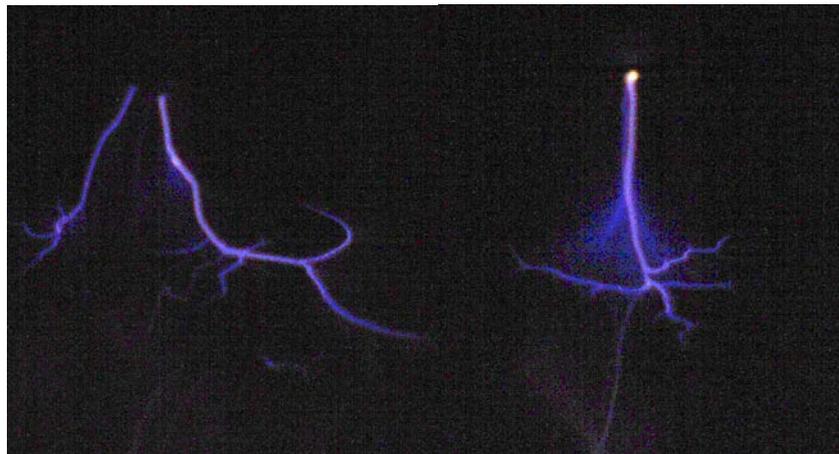


Figure 8. Examples of various types of artificially produced lightning by apparatus showed at Figure 5

3. Results

3.1. PHASE I

On the IR spectral analysis, the positions of the amino acid absorption peaks change during vibration (Figs 3, 4).

3.2. PHASE II

The analyses of both IR curves suggests that the position of selected IR absorption peaks was changed by a reaction with artificial lightning (Fig. 9). The spectral data is also presented in Table 1.

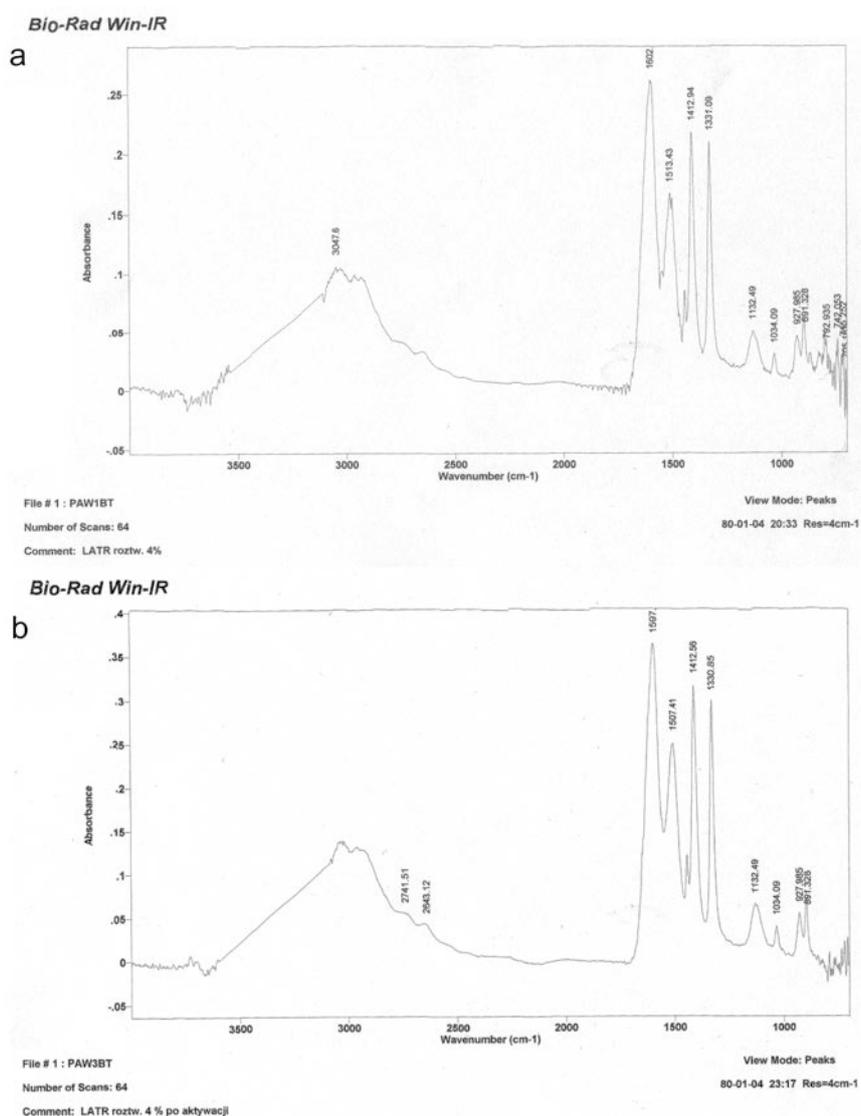


Figure 9. IR curves obtained during Phase II experiments.
a – glycine dissolved in water (stable conditions), b – glycine at vibrating conditions (quartz mixed with dissolved glycine treated by artificial lightning)

Table 1. Data from Phase II experiments. The IR absorption peak data was obtained after 24 hours of interaction between quartz, artificial lightning and glycine. The position of the peaks is measured in cm^{-1} .

Natural glycine	Glycine after experiment	
Primary position	Secondary position	Various bands of absorption
752.935	-	×
891.328	891.328	
997.985	997.985	
1034.09	1034.09	
1132.49	1132.49	
1331.09	1330.85	×
1412.94	1412.56	×
1513.43	1507.41	×
1602.00	1597.00	×

4. Interpretation

4.1. PHASE I

The change in IR absorption frequencies is interpreted to be a direct result of changes in the amino acid structure during vibration. It is likely that the primary structures of the amino acid is modified.

4.2. PHASE II

Table 1 shows that the amino acid was slightly transformed during activation by lightning.

Though experiments performed at phase I and II are various because at phase I we have selected frequency while at phase II quartz grains produce spectrum of frequency both methods showed possibility of modification of amino acids structure. Unfortunately was not observed vibration of amino acids after stop of quartz vibration but this phenomena may be active very short time impossible for observation using described methods.

5. Discussion

In relation to the hypothesis concerning the creation of life on Earth, the effect of lightning and vibration of quartz is to alter the amino acid structure from stable to vibrating. Later is possible that vibrating molecules of amino acids bonded one with another and modified leading to more and more complicated biological forms.

Unfortunately, the evidence for new and primitive forms of amino acid compounds in the rock record has not been preserved, due to the age of these molecules and the effect of geological processes.

In relation to presented hypothesis of early life on Earth, it is understandable that there is no life (as we know it) on the nearest astral bodies (planets, moons, etc.), as the surface geological layers do not contain quartz.

6. Conclusion

It was observed that vibrating quartz may alter the internal structure of selected amino acids. This phenomena is observed as a change in IR peak position.

7. References

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