

Amide in HCN, then water,
then information storage

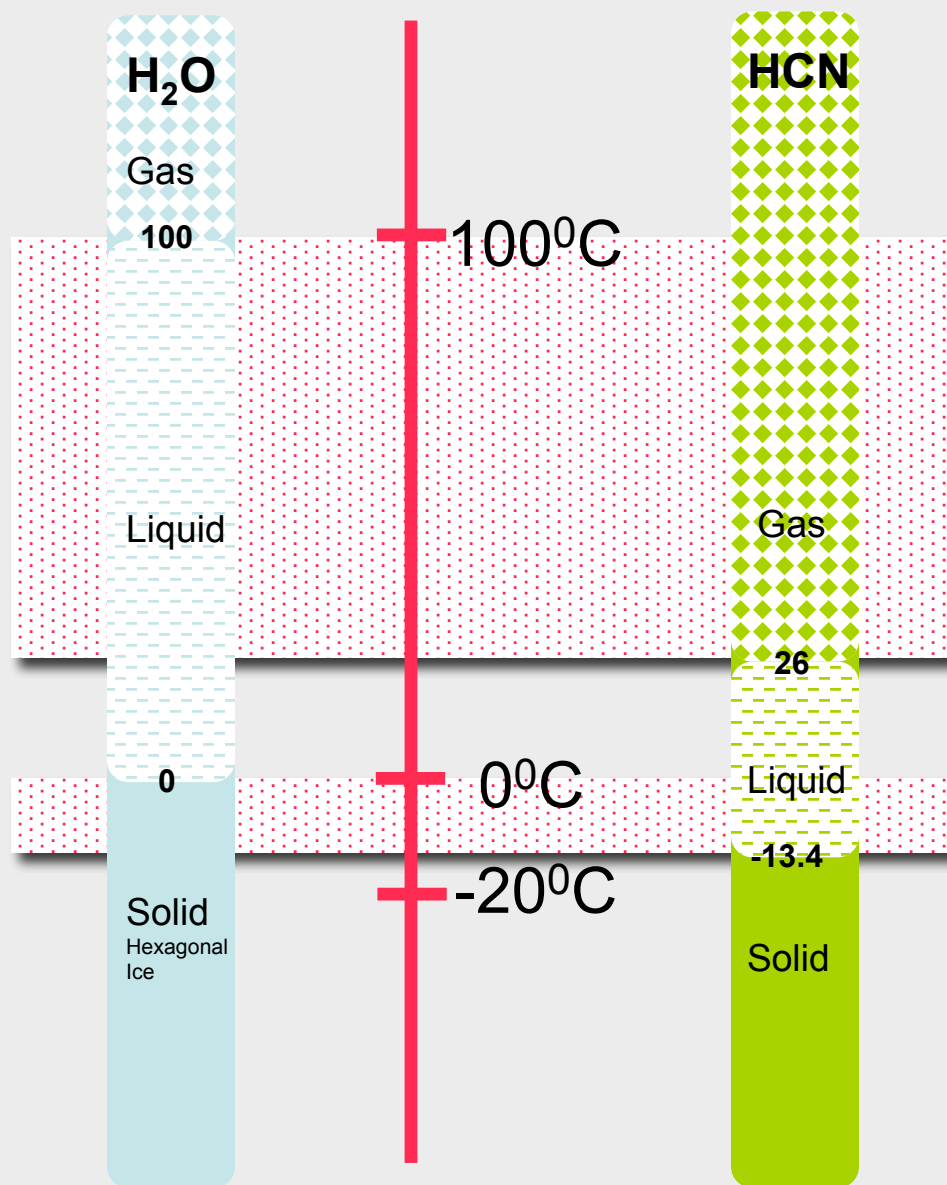
Time = 13.73 ± 0.12 Gyrs ago

NB: The halogen-based solvents that were **NOT** present 13 Gyrs ago:

CHCl_3 FP = -64°C , BP = $+62^\circ\text{C}$
a liquid at 10°C (Earth ambient temp)

CHF_3 FP = -160°C , BP = -82°C
a gas at 10°C (Earth ambient temp)

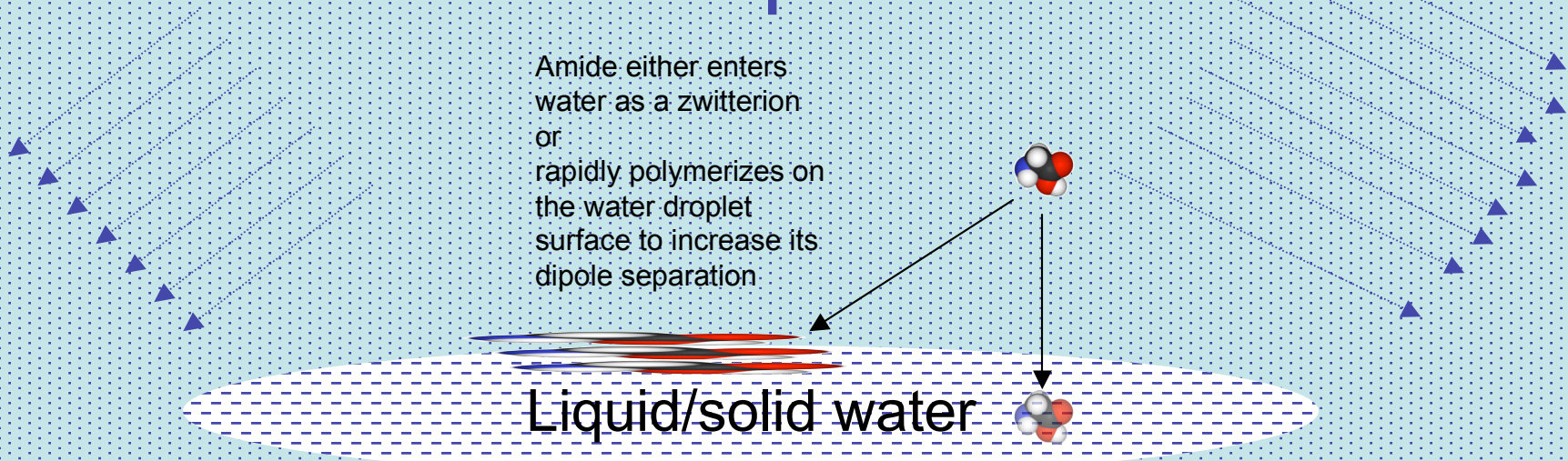
In the case of CHCl_3 it would act as a solvent, solubilizing hydrophobic polymer amide as soon as it formed, at the temperature ranges where both gas to liquid and liquid to solid exchange of amide occurred.



We start with the assumption that amide is synthesized in HCN from aldehydes & ketones
Or from polymerization of HCN in the presence of water.

Shaded Boxes represent temperature ranges that would support exchange of amide from gaseous HCN to liquid H₂O & liquid HCN to the surface of solid hexagonal water ice.

Gaseous /liquid HCN



Consequences:

In the system bulk water amide can be a substrate for many chemical reactions. But there is always the possibility that the water will evaporate ceasing all those chemical reactions.

Amide polymerization entraps the water which significantly lengthens the time that the chemical reactions within the water continue to operate.

It is assumed that chemical memory always operates in the Universe, so that when chemicals are destroyed due to stellar chaos, some sub-nanometer scale fragments remain to make it statistically more likely that the same chemical reactions will repeat. The water entrapped by polymer amide represents the phase that stores **information/memory**. Not all the polymer amide is a β -sheet based, water-tight skin - some adopts the α -helical conformation, forming channels. This channel form between successive layers of polymer amide skin allows the water phase containing ions and small substrates to pass between successive the layers of the amide skin.

Thus memory/information is the transport of current (charge) with phase matching to previously stored charge, between the layers of amide (material topology). The current oscillates (with a variable frequency and amplitude) and thus has immense capacity for information storage.

NB At first without divalent elements in existence the calcium dependent oscillations we see in Earth based experiments today, would have had to rely on current interruption via small substrates in the water phase between the layers of polymer amide.

The repeated zwitterion/polymer amide conundrum:

- # Zwitterion.
- # Amide polymer skin.

- # Chemicals in water - easily destroyed by stellar chaotic event.
- # Chemicals in water, the whole entrapped by polymer skin - harder egress and access for solvents, solutes & ions.

- # Chemicals destroyed by stellar chaotic event get slowly replaced by chemical memory.
- # Chemicals not destroyed by stellar chaotic event because they are within a stable micro-environment encapsulated by polymer amide - but they do not experience the selection pressure to instigate their replacement via chemical memory.

- # Later with cell-based systems a nucleotide based code replaced most chemical memory based replacement.
- # But chemical memory was retained and stored in the nervous system within stable micro-environment synaptic vesicles encapsulated by polymer amide. Memory for hertz, photons and charge could also be entrapped in other polymer amide conduits or between layers of polymer amide in spheres. Memory recall and identification as "same signal/recognized signal " would involve phase matching of the frequency/amplitude of the stored memory to the incoming new signal.

START at 13±4Gyr ago

1. Quarks
2. Electron/protons

13Gyrs MINUS 5e8 yrs ago

1. Loose association of H, He, Li - 1st stars.
2. Nucleosynthesis as centre of these first stars implode.
3. Atoms up to Oxygen 8-trace of others.
4. Atoms/Molecules/Materials that can make partitions so a separation of charge in a system is possible.

Halogen-based SOLVENTS:

CHCl_3 FP = -64C, BP = +62C
∴ a liquid at RT

CHF_3 FP = -160C, BP = -82C
∴ a gas at RT

12.5Gyrs ago

1. Entrapement of water by proteolipid.
2. Association of proteolipid with carboxylic acids which gets some proteolipid away from water.
3. “Sticky” proteolipid + carboxylic acid - no higher mass halogen-based solvents have arisen (e.g. chloroform (CHCl_3) with a freezing point of -64C & a boiling point of +62C) to counteract this “stickiness”. CHF_3 , the only halogen-based solvent that could have formed at this time is unsuitable as it is a gas with a freezing point of -160C & boiling point of -82C.
4. Accretion in the Universe begins, dependent on sticky proteolipid/carboxylic acids. First involving just low mass atoms/molecules/materials.

12.5-7.36Gyrs ago

1. All elements form.
2. More solvents like CHCl_3 arise (using the higher mass atoms like Cl) that solubilize solutes allowing them to now take part in more chemical reactions.
3. Further accretion involving low and high mass atoms/molecules/materials to denser solar masses that form galaxies of suns some of which have orbiting planets.