Replicating the Origin of Life Chemistry and Chemosynthesis by the Synthesis of Formic Acid, Formaldehyde, Glycerol, Methanol, Glycogen, Oxygen and Cyclodextrin from Carbonic Acid.

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Abstract

Replicating the origin of life chemistry, chemosynthesis and photosynthesis (CO_2 + $2H_2A$ + *hv* ---> (CH_2O) + 2A + H_2O) was possibly realized by reacting carbonic acid from carbon dioxide in water with atmosphere gasses methane, methanol, hydrogen sulfide, ammonia, cyanide and with low voltage electricity in carbonated water. Producing formaldehyde, formic acid, methanol, glycerol, oxygen, cyclodextrin, glycogen and unknowns. Where carbonic acid is hypothesized to initiate this chemistry ((H_2O + CO_2 <---> H_2CO_3) + atmosphere gasses + e^- + Al^{3+} ---> formic acid formaldehyde, methanol, glycerol, cyclodextrin, glycogen and oxygen).

Sodium hydrosulfide (NaSH) was used to replicate aqueous hydrogen sulfide (H_2S) to produce formaldehyde, formic acid and unknowns from bisulfide (HS^-); ($H_2S_{(aq)}$ <---> H^+ + HS^-), ($NaSH_{(aq)}$ <---> Na + HS^-).

Formaldehyde (CH_2O) was produced from carbonic acid from warm carbonated water and sodium hydrosulfide; producing 5800ug/L of formaldehyde and unknowns (H_2O + CO_2 <---> H_2CO_3 + {NaSH <---> Na + HS^-} <---> CH_2O + $2H_2O$ + 2S). (H_2CO_3 + $2H_2S$ ---> CH_2O + $2H_2O$ + 2S).

Formic acid (HCOOH) was produced from carbonic acid from carbonated water, cyanide and sodium hydrosulfide; producing 13,000mg/L of formic acid. 77,000mg/L was produced from ocean water. (H_2CO_3 + KCN + NaSH {$H_2S_{(aq)}$ <---> $2H^+$ + $2HS^-$} ---> HCOOH + unknowns).

Methanol (CH_3OH) was produced from carbonic acid from cold carbonated water and methane or propane; producing 33ug/L of methanol and unknowns. (H_2O + CO_2 <---> H_2CO_3 + CH_4 + H_2O ---> $2CH_3OH$ + O_2).

Glycerol ($C_3H_8O_3$) and oxygen were produced from carbonic acid from cold carbonated water and methanol; producing from 90-210ppm of glycerol and 1.1ug/L of oxygen. (H_2O + CO_2 <---> $2H_2CO_3$ + CH_3OH ---> $C_3H_8O_3$ + $2O_2$).

Cyclodextrin, STRUKTOL, glycogen and oxygen were produced from carbonic acid, silicic acid and a 1.5-volt battery hooked up to aluminum wire electrodes in warm carbonated water. A 1.5-volt battery was used to mimic the voltage that is produced by plants and cyanobacteria, theoretically producing these polymers from the electrolysis of aluminum (Al^{3+}) from the electricity produced by plants and cyanobacteria with carbonic acid to produce these polymers. (H_2CO_3 + 1.5-volts (e^-) + Al^{3+} ---> cyclodextrin, glycogen and oxygen).

From these initially produced compounds from carbonic acid; (formaldehyde, formic acid, methanol, glycerol, oxygen, glycogen, cyclodextrin and unknowns); adequate amounts of acetone, acetic acid, ribulose, ribose, rhamnose, amino acids, nucleosides, glycerol, fatty acids, monosaccharides, sugar phosphates, oxygen, ribulose derivates, noncarbohydrates, acetic acid derivatives, porphine, lactic acid, urea, nucleosides, methane and more were produced.

Phosphorylation of glucose into glucose 1 & 6-phosphate, fructose into fructose 6-phosphate and glycerol into glycerol 1, 2, 3-phosphate, was abiotically produced from distilled water, (glucose/fructose/glycerol), phosphoric acid, potassium cyanate and potassium hydroxide or calcium carbonate.

Introduction:

Presently, there is no logical evidence that supports the formaldehyde hypothesis of photosynthesis (Spoehr, 1916), ($CO_2 + 2H_2O + hv$ ---> $(CH_2O)_n + 2O + H_2O$). Anerobic photosynthesis ($CO_2 + H_2S + hv$ ---> $(CH_2O)_n + H_2O + 2S$), (Olsen), (Dhar, D.H., 1935), (Clayton, 1965). ($CO_2 + 2H_2A + hv$ ---> $CH_2O + 2A + H_2O$). Other hypothesizes of photosynthesis have also been proposed, one being the reduction of carbonic acid (Spoehr, 1916), (N.R. Dhar, 1935), (Nickelsen, 1960).

The origin of life chemistry is believed to originate from either warm primordial soup pools or from hydrothermal vents using either hydrogen sulfide, lightening or radiation as an energy source through the chemosynthesis process ($CO_2 + 4H_2S + O_2$ ---> $CH_2O + 4S + 3H_2O$). Hypothesized as ($CO_2 + H_2O$ ---> $H_2CO_3 + 2H_2S$ ---> $CH_2O + 2S + 2H_2O$).

Presented here, carbonic acid from carbon dioxide in water ($CO_2 + H_2O$ <---> H_2CO_3) was found to produce formaldehyde, formic acid, methanol, glycerol, oxygen, cyclodextrin, glycogen and unknowns when carbonated water was mixed with atmospheric gasses and compounds; methane, methanol, cyanide, ammonia, urea, silicic acid, sodium chloride, hydrogen sulfide, a 1.5-volt battery (e^-) and others. Possibly abiotically replicating chemosynthesis or photosynthesis and the origin of life chemistry.

Carbon dioxide in water was replicated with carbonated water, ocean water or distilled water with sodium chloride added. Carbonated water contains approximately 3 - 7 grams of carbon dioxide per liter, distilled water contains approximately 1.7 - 2 grams of carbon dioxide per liter and ocean water contains at least 1.45 grams of carbon dioxide per liter. The ocean absorbs approximately 30% of all the carbon dioxide released into the atmosphere.

Sodium hydrosulfide was used to replicate aqueous hydrogen sulfide to produce formic acid and formaldehyde for these experiments ($H_2S_{(aq)}$ <---> $H^+ + HS^-$), (NaSH <---> $Na + HS^-$), (Fig. 3).

Formaldehyde (CH_2O) was produced from carbonic acid from warm carbonated water and sodium hydrosulfide, producing 5,800ug/L of formaldehyde (H_2CO_3 + 4(NaSH <---> $Na + HS^-$) ---> $CH_2O + 2H_2O + 4S + 4Na$). {$H_2O + CO_2$ <---> H_2CO_3 + [$2H_2S_{(aq)}$ <---> ($2H^+ + 2HS^-$)] ---> $CH_2O + 2H_2O + 2S$}. Formaldehyde was found to produce, formic acid, methanol, glycerol and unknowns.

Formic acid (HCOOH) was produced from carbonic acid from carbonated water, cyanide and sodium hydrosulfide, producing 13,000mg/L of formic acid. 77,000mg/L of formic acid was produced from ocean water and cyanide (Table 2). [$H_2O + CO_2$ <---> H_2CO_3 + KCN + ($H_2S_{(aq)}$ <---> $H^+ + HS^-$) ---> HCOOH + unknowns]. Formic acid was found to produced acetic acid, acetone, rhamnose, glycerol, monosaccharides and unknowns.

Hydrogen sulfide (H_2S) in the early earth's atmosphere contained significantly greater concentrations than today and is considered the major energy contributor for the evolution of life for 90% of earth's history (Olson, 2015). Hydrogen sulfide is produced from volcanic activity, decaying organic matter and from plants. Research has shown that plants emit from 0.9ppm to 9ppm hydrogen sulfide from their leaves, which could be a source of hydrogen sulfide to produce formaldehyde and formic acid in the plant (Vargas - Munoz, 2022), (Wilson, 1978), (Fig. 4, 22). Increasing the hydrogen sulfide levels to plants has been found to be beneficial for plant growth.

Methanol (CH_3OH) was produced from carbonic acid from cold carbonated water and methane or propane, producing 33ug/L of methanol ($CO_2 + H_2O$ <---> $H_2CO_3 + CH_4 + H_2O$ --->

$2CH_3OH + O_2$), (Table 3). Plants produce 10-45 percent of the total global atmospheric methane, and could this methane produced by the plant be the main source for producing methanol in plants (Nisbet, 2009), (Covey, 2018), (Perez-Coronel 2022). Methanol was found to produce acetic acid, oxygen, ribose, ribulose, sugar alcohols, noncarbohydrates, glucose, glycerol, acetic acid derivatives, monosaccharides and more.

Glycerol ($C_3H_8O_3$) and oxygen were produced from carbonic acid from cold carbonated water and methanol, producing 90 – 210ppm of glycerol and 1.1ug/L of oxygen ($CO_2 + H_2O$ <---> $2H_2CO_3 + CH_3OH$ ---> $C_3H_8O_3 + 2O_2$), (Table 4, 5, 6). Glycerol was found to produce ribose, ribulose, rhamnose, noncarbohydrates, ribulose derivatives, deoxyribose and carbohydrate intermediates when hydrogen peroxide was added to glycerol.

Cyclodextrin (6-O-α-D-Maltosyl-β-Cyclodextrin), (STRUKTOL 1B 531), glycogen and oxygen were produced from carbonic acid, silicic acid, sodium hydrosulfide and a 1.5-volt battery hooked up to aluminum wire electrodes submerged in either warm carbonated water, or warm ocean water or warm distilled water with sodium chloride added. Polymers were also produced from a 1.5-volt battery and aluminum wire electrodes in warm carbonated water. A 1.5-volt battery was used to mimic the voltage that is produced by plants (0.28-volts - 0.626-volts) and cyanobacteria (1.4-volts - 1.5-volts) produced from the chemosynthesis or photosynthetic process from a reaction center that theoretically could produce these polymers from the electrolysis of aluminum (Al^{3+}) with carbonic acid in the plant or cyanobacteria. (H_2CO_3 + 1.5-volts (e^-) + Al^{3+} ---> cyclodextrin, glycogen and oxygen), (Fig. 7), (Arnold, 1976), (Sarma 2016), (Lakatos, 2021), (Cano, 2018).

Some of the complexity of the origin of life chemistry, chemosynthesis and photosynthesis was possibly demonstrated by the following experiments: 1) ($N_2 + H_2$ + propane (CH_4) + carbonated water + KCN + NaSH ---> formic acid, ribose, amino acids, ammonia and unknowns), (Fig. 6, 19), (UC Davis, Anresco, Stanford and ALS Labs). 2) (Distilled water + $N_2 + H_3PO_4 + CaCO_3$ ---> amino acids + ammonia + nitrates + organic acids), (Fig 22), (UC Davis). 3) (Ionized $KSi(OH)_4$ + CH_2O + KCN + NH_3 ---> amino acids and more), (Fig. 6), (Stanford). Adding ammonia to these experiments produced amino acids.

Abiotic Synthesis of Formaldehyde (Carbon Hydrate C-H_2O) from Carbonic Acid and Hydrogen Sulfide

Formaldehyde (CH_2O), 5800ug/L, was produced from carbonic acid from warm carbonated water and sodium hydrosulfide (NaSH), ($H_2O + CO_2$ <---> H_2CO_3 + [$H_2S_{(aq)}$ <--->$2HS^- + 2H^+$] ---> $CH_2O + 2H_2O + 2S$), (ALS Labs), (Table 1, #14). Formaldehyde was found to produce, formic acid, methanol, glycerol and unknowns.

Materials: Carbonated water, distilled water, sodium hydrosulfide hydrate, sodium chloride, silicic acid and a 12-volt battery hooked up to two coiled metal wire electrodes inside a mason jar made of either copper, steel, magnesium or aluminum (Fig 1).

Methods: Carbonated water was used as an elevated carbonic acid source ($CO_2 + H_2O$ <---> H_2CO_3 <---> $HCO_3^- + H^+$ <---> $CO_3^{2-} + H^+$). Sodium hydrosulfide was used to replicate hydrogen sulfide in aqueous form ($H_2S_{(aq)}$ <---> H^+ + HS^-), (NaSH <---> Na^+ + HS^-), (Fig. 3).

Results: The simplest method to produce formaldehyde resulted from warm carbonated water and sodium hydrosulfide hydrate (60mls warm carbonated water + 0.61mls NaSH ---> CH_2O, 5,800ug/L), (Table 1, #14), (ALS). (H_2CO_3 + ($H_2S_{(aq)}$ <---> $2H^+$ + $2HS^-$) ---> CH_2O + $2H_2O$ + 2S).

Formaldehyde was found to produce formic acid, methanol, glycerol and unknowns (Fig. 6), (Stanford), (Table 1, 2, 3).

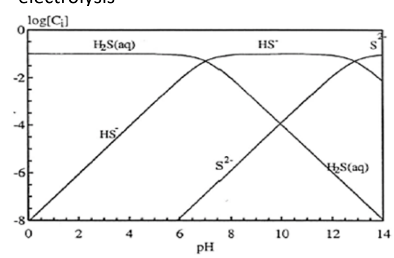
Discussion: Warm carbonated water and sodium hydrosulfide hydrate produced formaldehyde while cold carbonated water and sodium hydrosulfide did not produce any detectable formaldehyde according to ALS (MRL 300ug/L). ALS would not be able to detect any formaldehyde produced at concentrations of formaldehyde lower than 300ug/L. Cold carbonated water and sodium hydrosulfide needs to be tested for unknowns to see what was or not produced.

Formaldehyde and Formic Acid	CH_2O ug/L MRL 300	HCOOH mg/L MRL 1.0	CH_3OH mg/L MRL 0.5	Glycerol %	Amino Acids
1) 12V, CH_4, H_2.Distilled water + 1.25mls KCN + 0.61mls NasH	ND	2000			
2) 12V, CH_4, 60mls Carbonated water + KCN + 0.61mls NaSH	ND	6400			
3) 60mls carbonated water + 1.25mls KCN + 0.61mls NaSH	ND	910			
4) 60mls Distilled water + 1.25mls KCN + 0.61mls NaSH	ND	860			
5) 120mls carbonated water + 0.125mls NaSH	490	ND			
6) 12V, CO + CH_4 + 4oz carbonated water+ 0.61mls NaSH + 1.25mls H_2O_2	130	260			
7) 12V + 4oz carbonated water + 0.61mls NaSH	130	ND			
8) 12V, CO + 120mls carbonated water + 0.61mls NaSH + 1.25mls H_2O_2	160	ND			
9) 12V, CO, H_2, CH_4 + 4oz carbonated water + 0.61mls NaSH	120	ND			
10) 90mls carbonated water + 0.3mls KCN + 0.3mls NaSH$^-$	NT	13000			
11) 60mls iced carbonated water + 0.61mls NaSH 6-29-2020	170	NT			
12) 45mls Iced carbonated water+ 1/16 tsp NaSH	ND	ND			
13) propane + 6oz carbonated water+ 0.61mls NaSH gassed pH 7	NT	NT	2.5		
14) 60mls warm carbonated water + 0.61mls NaSH	5800				
16) 30mls H_2O + 5mls 16% CH_2O + 0.61mls NH_3OH + 4 drops HCOOH 9-22-21 Anresco				1.09	
17) 5mls 16% CH_2O + 30mls H_2O + 0.1mls NH_3OH + 5 drops HCOOH Anresco 11/30/21				1.18	
18) 45mls warm carbonated water + 12-Volts + H_2 + N_2	ND				ND
19) 45mls warm carbonated water + 12-volts + H_2	ND				ND
20) 45mls ocean water + 12-Volts	ND				ND
21) 12-volts + H_2 + .06mls NaCL + 60mls Dist Water	ND				ND
22) 12-volts + H_2 + 60mls H_2CO_3 + 0.6mls NaCl	ND				ND
23) 60mls Ocean water + 0.61mls NaSH					
24) 12-Volts + distilled water + CH_4	240	180			
25) 12-Volts + distilled water + CO	1300	170			

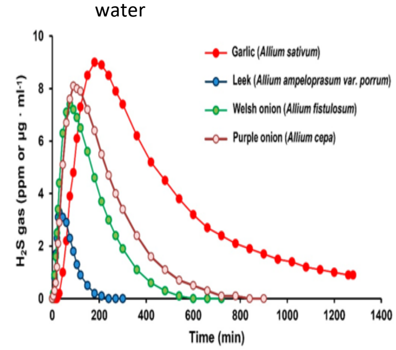
(Table 1)

(Fig 1) 1.5 -12-volt battery hooked up to a metal wire for electrolysis

(Fig 2) Aluminum wire electrodes



(Fig 3) Wikipedia. Hydrogen sulfide in water



(Fig 4) Munoz-Vargas, 2022) H_2S gas emission using 300 gms of fresh plant material

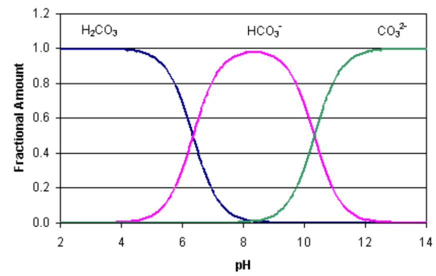
Abiotic Synthesis of Formic Acid from Carbonic Acid, Cyanide and Hydrogen Sulfide

Formic acid (HCOOH), 17,000mg/L was produced from carbonic acid from carbonated water, cyanide and sodium hydrosulfide. 77,000mg/L was produced from ocean water, cyanide and sodium hydrosulfide (ALS, UC Davis), (Table 2, #9, 13, 16), (Table 2, #19, 16). [H_2CO_3 + KCN + ($H_2S_{(aq)}$ <---> $2HS^-$ + $2H^+$) ---> HCOOH], (Table 2, #16-23). Formaldehyde also produced formic acid (Table 2, #10, 11). Formic acid was found to produce acetic acid, acetone, glycerol, rhamnose, monosaccharides and unknowns.

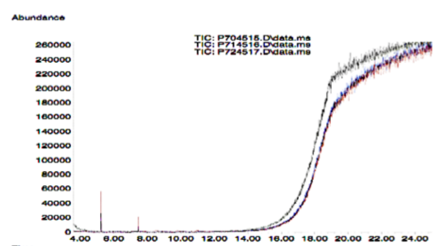
<u>Materials</u>: Distilled water, carbonated water, ocean water, 37% formaldehyde solution (with methanol), 16% formaldehyde (without methanol), sodium hydrosulfide hydrate (NaSH), sodium cyanide, potassium cyanide, dilute silicic acid, sodium thiocyanate, propane and methane.

Formic Acid	HCOOH mg/L	CH_3OH Mg/L	CH_2O Ug/L	Amino Acids
1) 12V, CH_4, H_2. 45mls Distilled Water + 0.61mls KCN + 1.25mls NaSH	2000			
2) 12V, CH_4, H_2. 45mls Carbonated water + 0.61mls KCN + 1.25mls NaSH	6400			
3) 45mls Carbonated water +0.61mls KCN + 1.25mls NaSH	910			
4) 45mls Distilled water + 0.6mls KCN + 1.25mls NaSH	860			
5) 12V, CO + CH_4 + 120mls carbonated water + 0.6mls NaSH + 1.25mls H_2O_2	260			
6) 12V, CO + CH_4 + 120mls carbonated water + 0.6mls NaSH	ND			
7) 12V, CO + 120mls carbonated water + 0.6mls NaSH + 1.25mls H_2O_2	ND			
8) 90mls carbonated water + 1.5mls KCN + 1.5mls NaSH	13000			
9) 90mls iced carbonated water + 1.25mls NaCN + 1.25mls NaSH	17000			
10) 60mls water + 0.6mls $NaSi(OH)_4$ + 5mls 16% CH_2O W/O CH_3OH + 0.31mls NaSCN + 3 drops CH_3CN + 0.6mls NH_3OH + 0.31mls NaSH + 1mls HCL. pH 6	84000	91	ND	
11) 60mls Carbonated water + 7 drops $NaSi(OH)_4$ + 5mls 16% CH_2O + 0.31mls NaSCN + 3 drops CH_3CN + 0.6mls NH_3OH+ 0.31mls NaSH + 6 drops HCl. pH 6.4	51000	68	ND	
12) 12 Volts, CO + 180mls carbonated water + 0.6mls $NaSi(OH)_4$ + 0.25mls H_2SO_4 + 0.15mls HCl + 0.031 mls KCN + 0.1mls H_DO + 0.031 mls $FeCO_3$, $FeSO_4$, $NiCO_3$, AlOH, FeCN,	170	ND	1300	
13) 12-Volts + 60mls carbonated water + propane + N_2 + 1.7mls HCN + 5mls NaSH	50000			
14) 30mls H_2O + 10mls 16% CH_2O + ¼ HCN + 0.55mls NH_3OH 11/23/21 ALS	ND			
15) 30mls H_2O + 5mls 37% CH_2O + 0.6mls KHCN + 0.65mls NH_3OH + 0.6mls tsp NaSH Dec 23, 2021 ALS	ND			
16) 45mls ocean water + 0.61mls KCN + 0.61mls NaSH	77000			
17)A) 12-Volts + 60mls H_2CO_3 + H_2 + 0.61mls KCN	ND			ND
19)C 12-Volts + H_2 + 60mls Ocean water + 0.61mls KCN	892 ppm			ND
20) 12V + H_2 + 60mls water + 0.6mls NaCl + 0.6mls KCN	ND			
21) 12V + H_2 + 60mls water + 0.6mls NaCN	ND			
22) 12V + H_2 + 60mls H_2CO_3 + 0.6mls NaCN	ND			
23) 12V + H_2 + 60mls H_2CO_3 + 0.6mls NaCl + 0.6mls KCN	ND			
Dilute: 8oz H_2O + 5mls $KSi(OH)_4$ or 5mls $NaSi(OH)_4$				

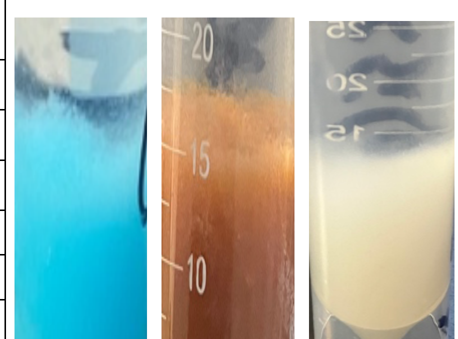
(Table 2)



(Fig 5) Wikipedia. CO_2, Carbonic acid in water



Ionized silicic acid + CH_2O + KCN + NH_3
(Fig 6) Stanford



(Fig 7). Polymer produced from carbonated water, sodium hydrosulfide, silicic acid and a 12-volt battery. Copper electrodes used on the left. Steel electrodes second from left. Far right 1.5-volts, aluminum electrodes, silicic acid and carbonated water.

Methods: Formic acid was produced from either carbonated water or ocean water, cyanide and sodium hydrosulfate hydrate. Sodium hydrosulfide was used to replicate hydrogen sulfide in aqueous form ($H_2S_{(aq)}$ <---> H^+ + HS^-), (NaSH <---> Na + HS^-).

Results: The simplest method to produce formic acid was from carbonated water, cyanide and sodium hydrosulfide; 1) (90mls carbonated water + 1.2ml KCN + 1.2ml NaSH ---> 17,000mg/L of HCOOH), (Table 2, #9), (ALS), (Fig. 16, UC Davis). 2) From ocean water (45mls ocean water + 0.61mls KCN + 0.61mls NaSH ---> 77,000mg/L of HCOOH), (Table 2, #16, ALS). 3) Higher yields of formic acid were produced from sodium cyanide versus potassium cyanide and when propane and a 12-volt battery was used (12-volts + 60mls carbonated water + propane + 0.6mls KCN + 5mls NaSH ---> 50,000mg/L formic acid), (Table 2, #13). 4) The highest yields of formic acid were produced from formaldehyde (5mls 16% CH_2O + 60mls H_2O + 0.61mls dilute $NaSi(OH)_4$ + 0.31mls KCN + 0.31mls NaSCN + 0.61mls NH_3OH + 0.3mls NaSH + 0.5mls HCL ---> 84,000mg/L of HCOOH), (Table 2, #9, 10), (Table 1, 2 #9, 3, 8, 10).

Formic acid produced; acetic acid, monosaccharides, acetone, glycerol, rhamnose, oxygen methanol and unknowns (Table 5, 6, 7, 9).

Discussion: Evidence from (Table 2, #10, 11) suggests that the synthesis of formic acid could proceed from formaldehyde. Ocean water, a 12-volt battery, cyanide and sodium hydrosulfide produced formic acid and a polymer (Table 2, #19). Adding sodium chloride and silicic acid significantly influenced the yields of formic acid produced. Sodium cyanide produced more formic acid than potassium cyanide (Table 2, #9, 10).

Abiotic Synthesis of Methanol from Methane or Propane and Carbonic acid.

Methanol (CH_3OH), 33ug/mL was produced from carbonic acid by bubbling propane or methane in cold carbonated water (H_2CO_3 + CH_4 + H_2O---> $2CH_3OH$ + O_2), (Table 3, #11), (ALS). Higher yields were obtained from 16% formaldehyde (Table 4, #19). Methanol was found to produce acetic acid, oxygen, ribose, ribulose, sugar alcohols, noncarbohydrates, glucose, acetic acid, glycerol, acetic acid derivatives and monosaccharides.

Materials: Carbonated water, distilled water, formic acid, formaldehyde (16%, without methanol), potassium bicarbonate, potassium thiocyanate, sulfuric acid, ammonia hydroxide, methyl cyanide, sodium hydrosulfide hydrate, potassium hydroxide, propane, methane and dilute silicic acid.

Methods: Bubbling methane or propane into carbonated water was the simplest method to produce methanol (Table 3, #11).

Results: Bubbling propane into carbonated water produced 33ug/mL of methanol (Table 4, #1, 14, 17), (Table 3, (#11, #12)), (ALS). Providing evidence that methanol can be easily produced in the plant from carbonated water from either atmospheric methane, propane or methane produced by the plant (Nisbet, 2009, Covey, 2018). Methane was produced from (12volts + H_2 +

180mls cold carbonated water + 2.5mls $KSi(OH)_4$ + 0.17mls H_2SO_4 + 0.61mls SCN + 0.61mls NaSH ---> 5ug/L of CH_4), however these results were not reliable (ALS), (Keppler, 2006).

16% formaldehyde solution produced the highest yields of methanol (60mls H_2O + 0.61mls $KSi(OH)_4$ + 5mls 16% CH_2O + 0.3mls CH_3CN + 0.61mls KSCN + 0.61mls NaSH ---> 2,200ug/ml of methanol), (Table 3, #10, 19, 20). When formic acid was used instead of formaldehyde the yields of methanol were reduced from 91% - 99.8% (ALS).

Methanol produced noncarbohydrates, acetic acid derivatives, acetic acid, glucose, glycerol, oxygen and monosaccharides (CCRC, Anresco, ETS Analytical and R&L Analytical).

Methanol	HCOOH mg/L	CH_3OH ug/ml
1) 210mls rain water + 1.25mls $NaSi(OH)_4$ + 5mls 16% CH_2O (no CH_3OH) + 0.6mls HCl + 0.3mls H_2SO_4 + 0.3mls NaSH + 0.6mls $KHCO_3$.	31	28
2) 120mls water + 5mls CH_2O (w/o CH_3OH) + 1ml dilute $KSi(OH)_4$ + 1.25mls CH_3CN + 1.1mls H_2SO_4		34
3) 60mls H_2O + 5mls CH_2O (w/o CH_3OH) 2.5mls dilute $KSi(OH)_4$ + 1.3mls CH_3CN + 0.6mls NaSH		210
4) 180mls water + 2mls dilute $KSi(OH)_4$ + 5 mls CH_2O (w/o CH_3OH) + 1.3mls CH_3OH + 0.6mls NaSH + 1ml HCL + 0.6mls NaSH		110
5) 120mls water + 5mls CH_2O (w/o CH_3OH) + 1.1mls CH_3CN + 0.6mls NaSH + 0.5mls H_2SO_4 + NaSH to pH 7		44
6) 150mls water + 0.3mls dilute $KSi(OH)_4$ + 5mls CH_2O (w/o CH_3OH) + 0.6mls NaSH + 1ml NH_3 + 1ml H_2SO_4 + NaSH pH 6 No CH_3CN		91
7) 150mls water + 2.2mls dilute $KSi(OH)_4$ + 5mls CH_2O (w/o CH_3OH) + 1.3mls CH_3CN + 0.6mls NH_3 + 0.1mls H_2SO_4 No NaSH		57
8) 90mls H_2CO_3 + CH_4 + 0.6mls $NaSH^-$ 2-19-20		2.5
9) 60mls water + 1.2mls $NaSi(OH)_4$ + 5mls 16% CH_2O + 1,25mls SCN + 1.25mls NaSH pH 8+		750
10) 60mls water + 1mls dilute $NaSi(OH)_4$ + 5mls 16% CH_2O + 0.6mls KHCN + 0.6mls SCN + 0.3mls NaSH		750
11) 60mls carbonated water + propane Oct 12		33
12) 60mls cold carbonated water + propane + 1mls NaSH		8.8

Methanol	CH_3OH ug/ml	HCOOH mg/L
13) 60mls water + 1.25mls dilute NaSi(OH)4 + 2.5mls HCOOH + 1.25mls NaSH	1.7	
14) 60mls water + 1.25mls dilute NaSi(OH)4 + 2.5mls HCOOH + 0.3mls Thiocyanide + 0.3mls NaSH	1.6	
15) 60mls water + 1.25mls dilute NaSi(OH)4 + 2.5mls HCOOH + 0.6mls CH_3CN + 0.6mls NaSH	1.4	
16) 60mls water + 1.25mls dilute $KSi(OH)_4$ + 1.25mls HCOOH + 0.6mls NaSH	3.7	
17) 60mls water + 1.25mls dlute $KSi(OH)_4$ + 1.25mls HCOOH + 0.3mls ThioCN + 0.3mls NaSH	1.9	
18) 60mls water + 0.6mls NaSi(OH)4 + 5mls 16% CH_2O + 0.3mls KSCN + 0.3mls CH_3CN + 0.6mls NaSH	876	
19) 60mls water + 0.6mls dilute $KSi(OH)_4$ + 5mls 16% CH_2O + 0.3mls KSCN + 0.3mls CH_3CN + 0.6mls NaSH	2200	
20) 60mls H_2O + 1.25mls dilute $NaSi(OH)_4$ + 5mls 16% CH_2O + 0.1mls H_2SO_4 + 1.25mls NaSH	1200	
21) 60mls H_2O + 1.25ml dilute $NaSi(OH)_4$ + 1.25mls HCOOH + 0.1mls H_2SO_4 + 0.3mls KSCN + 1.25mls NaSH	18	
22) 60mls air bubbled water + 0.6mls $NaSi(OH)_4$ + 5mls 16% CH_2O + 0.3mls CH_3CN + 0.1mlsH_2SO_4 + 0.3mls NaSH + 0.3mls NH_3 + 0.1mls $KHCO_3$ + 0.1mls H_2SO_4	120	28
Dilute: 240mls H_2O + 5mls $KSi(OH)_4$ or 5mls $NaSi(OH)_4$		

(Table 3)

Discussion: Plants produce 10-45 percent of the total global atmospheric methane; could this methane produced by the plant be a source of methane to produce methanol from carbonic acid, thus accounting for methanol emission from plants (Nisbet, 2009, Covey, 2018).

Research has shown that the application of methanol to the leaves will increase yields (Fall, 1996), (Harley, 2007), (MacDonald, 1993), (Nemecek, 1995). Ocean water should also be tested for the synthesis of methanol (Ocean water + methane ---> CH_3OH). Using warm carbonated water instead of cold.

Abiotic Synthesis of Glycerol and Oxygen from Carbonic Acid and Methanol and the Abiotic Synthesis of Glycerol 1, 2, 3-Phosphate.

Glycerol ($C_3H_8O_3$) and oxygen were produced from carbonic acid from cold carbonated water and methanol, producing from 70ppm to 220ppm glycerol and 1.1 mg/L oxygen ($2H_2CO_3$ + CH_3OH ---> $C_3H_8O_3$ + $2O_2$), (Table 4, #1, 10), (Table 5, #1), (Iowa Central Fuel Testing, R&L Analytical and CCRC). Greater yields of glycerol were produced when sulfuric acid and acetone was added (Table 4, #14), (CCRC). Glycerol was also produced from formaldehyde and xylitol

(Table 4, #22, 23).

Glycerol produced ribose, ribulose, rhamnose, noncarbohydrates and carbohydrate intermediates when hydrogen peroxide was added to glycerol and formic acid (CCRC, R&I Analytical, SDK, Anresco), (Table 6, #28, 33).

Glycerol 1, 2 & 3 phosphate, was produced from glycerol, phosphoric acid, cyanate and potassium hydroxide/calcium carbonate (Fig. 8).

Materials: Distilled water, carbonated water, glycerol, phosphoric acid, potassium cyanate, calcium carbonate, silicic acid, methanol, acetone, sulfuric acid, formic acid and potassium hydroxide.

Methods: Mixing in order and combinations of cold carbonated water, distilled water, sulfuric acid, formic acid, methanol, cyanate and acetone.

Results: Glycerol was produced from; 1) Cold carbonated water and methanol (30mls cold carbonated water + 15mls methanol ---> 90ppm of glycerol and 1.1mg/L of oxygen), (CCRC, Iowa Central Fuel testing and R&I Analytical), (Table 4, #24), (Table 5, #1). 2) From formic acid, carbonated water and acetone (30mls carbonated water + 0.61mls formic acid + 10mls acetone ---> 709.2ug/ml of glycerol), (CCRC), (Table 4, #19), (Fig 13, CCRC). 3) From methanol, carbonated water and sulfuric acid (30mls carbonated water + 0.17mls H_2SO_4 + 10mls CH_3OH ---> 374.2ug/mg of glycerol, pinitol, glucose, xylitol, arabinose, xylose and 1.1mg/L oxygen), (Fig 9), (CCRC), (Table 5, #1, R&I Analytical). 4) From 16% formaldehyde (5mls 16% CH_2O + 30mls H_2O + 0.61mls NH_3OH + 0.3mls HCOOH ---> 10,900ppm of glycerol) and (30mls distilled water + 5mls 16% formaldehyde + 0.61mls NH_3OH + 5mls H_2O_2 + 0.55mls HCOOH ---> 3.7% solution of glycerol), (Table 4, #22, 23, 26), (Anresco). 5) From xylitol (15mls xylitol + 15mls distilled water + 10mls H_2O_2 + 0.5mls HCOOH ---> 4.2ug/10uL of glycerol + 24.3ug/uL of ribulose + fructose + ribitol derivates), (CCRC).

Ribose was produced from the oxidation of glycerol with hydrogen peroxide in distilled water; 1) (10mls glycerol + 15mls distilled water + 5mls H_2O_2 + 10mls CH_3OH ---> 1900ppm solution of ribose), (Table 6, #27, Anresco). 2) (15mls glycerol + 10mls H_2O + 0.3mls dilute $NaSi(OH)_4$ + 2.5mls acetone + 5mls H_2O_2 + 7mls CH_3OH ---> 20.8% solution of ribose), (Anresco), (Table 6, #35). 3) (10mls glycerol + 15mls H_2O + 5mls H_2O_2 + 0.61mls HCOOH ---> 35.2ug/uL of ribose), (Table 6, #33, Anresco).

Ribulose was produced from the oxidation of glycerol with hydrogen peroxide in carbonated water; (15mls glycerol + 15mls cold carbonated water + 0.3mls HCOOH + 10mls H_2O_2 + 5mls CH_3OH ---> 24.6ug/uL of ribulose + non-carbohydrates), (Table 6, #14, 28, 30, 32), (CCRC, Anresco). ($C_3H_8O_3$ + H_2CO_3 + HCOOH + $2H_2O_2$ ---> $C_5H_{10}O_5$ + $3H_2O$ + $2O_2$).

Rhamnose was produced from the oxidation of glycerol with hydrogen peroxide in distilled water; 1) (5mls glycerol + 60mls H_2O + 1.23mls acetone + 2.5mls H_2O_2 + 0.61mls HCOOH ---> 12.9% solution of rhamnose), (Table 6, 1-5, 31), (Anresco, SDK). 2) (5mls glycerol + 30mls H_2O + 2.5mls H_2O_2 + 0.61mls HCOOH ---> 40.63% solution of rhamnose), (Table 6, #1-5, 17, 31), (Anresco, SDK).

Rhamnose produced ribulose, ribulose derivatives and non-carbohydrates from; 1) (15mls rhamnose + 20mls H_2O + 0.61mls HCOOH + 0.088mls H_3PO_4 + 0.15mls KOCN + 0.15mls HCN --->

ribulose + ribulose derivatives + non-carbohydrates (CCRC). 2) (10mls Rhamnose + 15mls H_2O + 0.3mls HCOOH + 0.31mls H_3PO_4 + 1.25mls KOCN + 0.61mls KOH ---> 11.7mg/mL of ribulose + mannose-semicarbazone + 1,5-anhydrol-1-rhamnitol + glucopyranosyl azide + ribono-1,4-lactone + 4-acetamideo-4,6-dideoxyl-galactopranose + 1,4-anhydro-D-xylitol), (CCRC).

Glycerol 1, 2 and 3-phosphate was produced from (30mls H_2O + 60mls $C_3H_8O_3$ + 10mls H_3PO_4 + 5mls KOCN + 2.5mls KOH ---> $C_3H_9O_6P$), (Fig 8), (CCRC).

Sugar Alcohol-Polyols	Xylitol	Glycerol ppm	Galactitol	Non-Carbohydrates unknowns
1) 90mls iced carbonated water+ 0.09mls H_2SO_4 + 15mls CH_3OH		210		
2) 90mls carbonated water+ 15mls erythritol	0	0	0	
3) 90mls carbonated water+ 15mls glycerol	0	182,000	0	
4) 90mls carbonated water + 10mls ethanol (Fig 16, #14)	+++	0	0	
5) (Fig16, #9) 30mls carbonated water + 0.6mls HCOOH + 10mls isopropyl	0	0	0	+++++
6) 2.5mls HCOOH + 30mls carbonated water +10mls CH_3OH + 10 drops NH_3OH		5100		
7) 30mls formamide + 5mls H_2O_2 + 5mls HCOOH + ¼ tsp NH_3OH			1.36%	
8) (Fig 16, #13) 15mls xylitol + 15mls H_2O + 10mls H_2O_2 + 0.5mls HCOOH	+++	4,200 ,000		++
9) 35mls cold carbonated water + 0.85mls NH_3OH + 5mls CH_3OH 11/30/21	ND	ND		
10) 15mls cold carbonated water + 15mls cold CH_3OH		190		
11) 15mls H_2O + 15mls CH_3OH + 0.3mls KCN		80		
12) 15mls carbonated water + 5mls dilute $Si(OH)_4$ + 15mls CH_3OH		70		
13) 30mls carbonated water iced + 0.3mls HCOOH + 15mls CH_3OH iced		170		
14) 30mls carbonated water + 0.6mls HCOOH + 10mls acetone CCRC		709,2 00		
14b) 30mls carbonated water + 0.6mls HCOOH + 10mls acetone ICF		0.00		

Sugar Alcohols	Xylitol ppm	Glycerol ppm
14c) 30mls water + 0.6mls HCOOH + 10mls Acetone (Iowa Central Fuel testing)		320
I5) 90mls carbonated water + 15mls sorbitol	0	0
16) 90mls carbonated water+ 15mls mannitol	0	0
17) 90mls carbonated water+ 15mls a-Terpineol	0	0
18) 540mls carbonated water + 0.35mls H_2SO_4 + 60mls Methanol-concentrated		100
19) 90mls carbonated water + 15mls xylitol	0	0
20) 25mls formamide + 5mls H_2O_2 + 10mls CH_3OH	600	100
21) 2.5mls HCOOH + 30mls carbonated water + 0.85mls NH_3OH + 10mls CH_3OH		1100
22) 30mls H_2O + 16% CH_2O + 0.65mls NH_3OH + 0.31mls HCOOH		10900
23) 5mls 16% CH_2O + 30mls H_2O + 1.5mls NH_3OH + 0.61mls HCOOH 11/23		11800
24) 15mls carbonated water + 15mls CH_3OH		90
25) 15mls carbonated water iced + 0.35mls H_2SO_4 + 15mls CH_3OH iced		210
26) 10mls CH_2O + 1.6mls NH_3OH + 5mls H_2O_2 + 0.91mls HCOOH		3.76%

(Table 4)

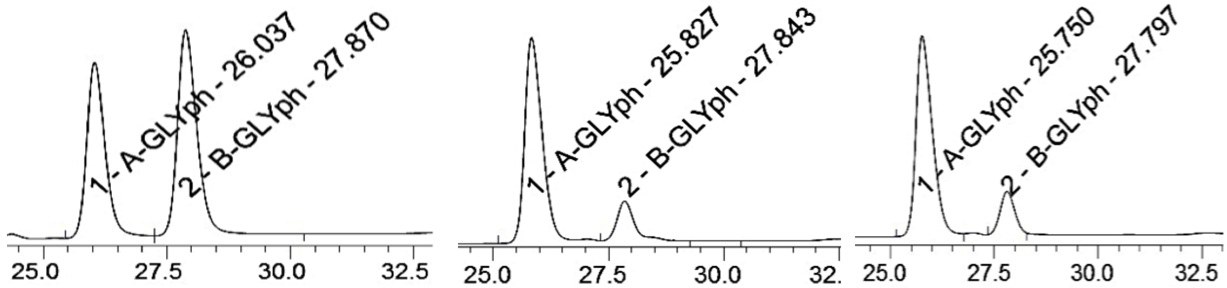
Oxygen from Carbonic Acid	Glycerol ppm	O_2 mg/L
1) 90mls carbonated water iced + 0.09mls H_2SO_4 + 15mls CH_3OH	210	1.1
2) 90mls carbonated water (iced) + 0.09mls H_2SO_4 + 15mls butanol		0.4
3) 90mls carbonated water + 0.17mls HCOOH + 10mls isopropyl		1.6
4) 90mls carbonated water iced + 0.09mls H_2SO_4 + 5mls mannitol		0.8
5) carbonated water + 0.09mls H_2SO_4 **Control**		0.3
6) 90mls carbonated water iced + 0.09mls H_2SO_4 + 0.41mls NaSH		0.3
7) Carbonated water **Control**		0.3
8) 90mls carbonated water iced + 0.09mls H_2SO_4 + 15mls Ethanol (Fig 16, #14)		0.6

Oxygen from Carbonic Acid	O_2 mg/L
9) 90mls carbonated water (iced) + 0.09mls H_2SO_4 + 15mls maltitol	0.7
10) 90mls carbonated water iced + 0.09mls H_2SO_4 + 15mls butanol	0.4
11) 90mls carbonated water iced + 0.09mls H_2SO_4 + 5mls xylitol	0.3
12) 90mls carbonated water iced + 0.09mls H_2SO_4 + 5mls erythritol	0.5
13) 90mls carbonated water iced + 0.09mls H_2SO_4 + 5mls inositol	2.0
14) 90mls carbonated water iced + 0.09mls H_2SO_4 + 10mls polyethylene glycol	2.0
15) 90mls carbonated water iced + 0.09mls H_2SO_4 + 5mls dulcitol	2.8
16) 90mls carbonated water iced + 0.09mls H_2SO_4 + 15mls glycerol	1.1
17) 90mls carbonated water + 0.61mls SCN (chemical test)	3ppm

(Table 5)
R&L Analytical

Discussion: Anresco and SDK laboratories mass spectrometry machines were calibrated to test only for rhamnose from a standard sample of rhamnose purchased from Sigma Aldrich (Table 6, #1-5, 31).

Since glycerol was easily produced from formaldehyde, xylitol, methanol and carbonated water, and that glycerol was found to produce, ribulose, rhamnose, carbohydrate intermediates, non-carbohydrates and lipids. Makes one question if glycerol could be the first sugar alcohol of photosynthesis that also produces monosaccharides and carbohydrate intermediates by detoxifying hydrogen peroxide in plants (Hopkins, 2009, Plant Physiology).



Both samples contained significant amounts of Glycerol 1/3-phosphate, or otherwise denoted as α-Gly phosphate, eluting at ~25.8 min. Also, small amounts of Glycerol 2-phosphate or β-Gly phosphate were detected in both samples eluting around ~27.8 min.

Both samples contained significant amounts of Glycerol 1/3-phosphate, or otherwise denoted as α-Gly phosphate, eluting at ~25.8 min. Also, small amounts of Glycerol 2-phosphate or β-Gly phosphate were detected in both samples eluting around ~27.8 min. CCRC

(Fig.8) Sample Contents: 30mls water + 30mls glycerol + 5mls phosphoric acid + 5mls potassium cyanate + 2.5mls calcium carbonate + 5mls potassium hydroxide to adjust pH close to neutral (CCRC).

Abiotic Synthesis of Monosaccharides; Glucose, Rhamnose, Ribose, Ribulose, Xylose, Fructose, Fructose 6-Phosphate and Glucose 1 & 6-Phosphate.

Monosaccharides; glucose, ribose, ribulose, rhamnose, fructose, mannose, maltose and others were produced when various sugar alcohols were oxidized with 3% hydrogen peroxide solution (Table 6), (Fig. 10).

Glucose 1 & 6-phosphate and fructose 6-phosphate was produced from distilled water, phosphoric acid, glucose/fructose/glycerol, potassium cyanate, dilute silicic acid and potassium hydroxide/calcium carbonate for pH adjustment (Fig. 13).

Materials: Sugar alcohols, carbonated water, distilled water, glycerol, 3% hydrogen peroxide, glucose, formic acid, acetic acid, potassium cyanate, phosphoric acid, dilute silicic acid and calcium carbonate (Table 6).

Methods: Mixing distilled water and carbonated water with various species of sugar alcohol, then adding 3% hydrogen peroxide solution and formic acid or acetic acid or methanol to produced monosaccharides.

Phosphorylation of glucose and fructose was achieved with; distilled water, potassium cyanate, phosphoric acid, formic acid, acetic acid and pH adjusted with potassium hydroxide.

Results: It was found that the general chemistry for the synthesis of monosaccharides from sugar alcohols as (60mls H_2O + 5mls sugar alcohol + 2.5mls H_2O_2 + 0.61mls HCOOH ---> monosaccharides), (Table 6, # 1-5, 1, 31), (SDK, Anresco Labs). Substituting acetic acid and methanol for formic acid reduced the yields of monosaccharides produced.

Glucose was produced from the oxidation of either sorbitol or mannitol with hydrogen peroxide; 1) (15mls mannitol/sorbitol + 20mls distilled water + 2.5mls H_2O_2 + 0.3 - 0.61mls formic acid or acetic acid ---> 20% solution of glucose), (Table 6, #8-11 & 21-23). 2) Lower yields of glucose were produced from dulcitol and arabitol. Glucose was also produced from mannitol;

($C_6H_{14}O_6 + H_2O + H_2O_2 + 6HCOOH$ ---> $2C_6H_{12}O_6 + 3H_2O + 3O_2$).

Sugar Alcohol ---> Monosaccharides %	Rhamnose	Glucose	Lactose	Maltose	Fructose	Xylose	Ribose	Ribulose Ug/uL	Galactitol
1) 5mls glycerol + 60mls iced H_2CO_3 + 2.5mls H_2O_2 + 1.3mls HCOOH	11.7%	0	0	0	O	0			
2) 5mls glycerol + 2 oz water + 2.5mls H_2O_2 + 1.3mls HCOOH	12.2	0	0	0	0	0			
3) 5mls glycerol + 2 oz H_2CO_3 iced + 2.5mls H_2O_2 + 1.3mls HCOOH + 2mls tsp $KHCO_3$	8.4	0	0	0	0	0			
4) 5mls glycerol + 60mls water + 0.6mls HS + 2.5mls H_2O_2 + 1.3mls HCOOH	11.7	0	0	0	0	0			
5) 5mls glycerol + 60mls water + 1.25mls acetone + 2.5mls H_2O_2 + 1.3mls HCOOH	12.9	0	0	0	0	0			
6) 15mls xylitol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	0	14.4%	0			
6b) 15mls xylitol + 60mls H_2O + 2.5mls H_2O_2 + 1.25mls HCOOH					20.8%				
7) 15mls Erythritol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	0	0	23			
8) 15mls Mannitol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	19.3	0	0	0	0			
9) 15mls sorbitol + 60mls water + 2.5mls H_2O_2 + 0.5mls HCOOH	0	25.5	0	0	0	0			
10) 15mls sorbitol + 60mls water + 2.5mls H_2O_2 + 0.5mls H_3PO_4 + 0.6mls $CaCO_3$	0	22	0	0	0	0			
11) 15mls sorbitol + 60mls water + 2.5mls H_2O_2 + 0.31mls CH_3COOH	0	19.6	0	0	0	0			
12) 15mls Inositol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	24.1	0	0			
13) 15mls Polyethylene Glycol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	0	0	0			
14) 15mls Adonitol/Ribitol + 30mls water + 2.5mls H_2O_2 + 0.8mls HCOOH	0	0	0	0	0	0	0.3%	0.3%	
15) 5 gms Adonitol + 40mls H_2O + 2.5mls H_2O_2 + 2.5mls CH_3OH	0	0	0	0	0	0	0	0	
16) 5 gms Adonitol + 15 mls water + 10mls H_2O_2 + 15mls CH_3OH						O	0	0	
17) 15mls Maltitol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0.4	0	0	20.4	0	0			
18) 15mls Inositol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	19.8	0.2	0	0		
19) 5gms Lactitol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	0	0.1	0	0	0	
20) 15mls D-Arabitol + 60mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	0	0	0	13.8%	0			
21) 15mls Dulcitol + 90mls water + 2.5mls H_2O_2 + 1.3mls HCOOH	0	3.6	0	0	0.1	0			
22) 15mls Dulcitol + 30mls H_2O + 2.5mls H_2O_2 + 5mls CH_3OH		5.12							
23) 15mls glucose + 60mls water + 2.5mls H_2O_2 + 1ml HCOOH	0	12.5	0	0	0	0	0	0	
24) 15mls Terpineol + 60mls water + 2.5mls H_2O_2 + 1.1mls HCOOH	0	0	0	0	0	0	0	0	
25) 15mls Ribose + 60mls water + 2.5mls H_2O_2 + 1.1mls HCOOH	0	0	0	0	0	0	20%	0	
26)30mls Formamide + 5mls H_2O_2 + 5mls HCOOH + 1.25mls NH_3OH							0		1.36%
27) 10mls Glycerol + 15mls water + 5mls H_2O_2 + 1.3mls CH_3OH							0.19		
28) Fig 16, #10) 10mls glycerol+ 20mls carbonated water + 10mls H_2O_2 + 1.3mls HCOOH (CCRC)	0							17.1	
29) 25mls Water + 1.25mls NH_3OH + 5mls CH_3OH	0	0	0	0	0	0	0	0	0
30) Fig 16, #26) 2.5mls HCOOH + 30mls Carbonated water + 10mls CH_3OH + 2mls NH_3OH (CCRC)								26.7	
31) 5mls glycerol + 30mls H_2O + 2.5mls H_2O_2 + 1.3mls HCOOH	40.63								
32) 10mls glycerol + 15mls H_2O + 5mls H_2O_2 + 5mls CH_3OH								13.11	
33) 10mls glycerol + 15mls H_2O + 5mls H_2O_2 + 1.2mls HCOOH							35.2		
34) 35mls cold carbonated water + 2mls NH_3OH + 5mls CH_3OH 11-30	ND	ND	ND	ND	ND	ND	ND	ND	ND
35) 15mls glycerol + 10mls H_2O + 0.5mls dilute $NaSi(OH)_4$ + 2.5mls acetone + 5mls H_2O_2 + 7mls CH_3OH 5-29-22							20.8		

(Table 6) (Anresco, SDK Analytical)

Ribose was produced from distilled water, glycerol, methanol or formic acid and 3% hydrogen peroxide; 1) (10mls glycerol + 15mls water + 5mls H_2O_2 + 0.61mls HCOOH ---> 35.2% solution of ribose), (Table 6, #27, 33, 35). 2) From adonitol and ribitol, ribose was produced (10mls adonitol/ribitol + 15mls water + 10mls H_2O_2 + 0.61mls HCOOH ---> 0.28% solution of ribose + 0.29% solution of ribulose + glycerol + non-carbohydrates + unknowns), (CCRC), (Anresco), (Table 6, #14, 25, 27, 28, 30, 32), (Fig 9, 10).

Ribulose was produced from carbonated water, hydrogen peroxide, formic acid, methanol and ammonia; 1) (2.5mls HCOOH + 30mls carbonated water + 10mls CH_3OH + 2mls NH_3OH ---> 26.7mg/uL ribulose), (Table 6, #14, 28, 30, 32), (CCRC and Anresco). 2) (10mls glycerol + 20mls carbonated water + 10mls H_2O_2 + 0.95mls HCOOH ---> 17,100ppm solution of ribulose), (CCRC). ($C_3H_8O_3 + H_2CO_3 + HCOOH + H_2O_2$ ---> $C_5H_{10}O_5 + 3H_2O + 2O_2$). 3) (10mls Glycerol + 15mls distilled water + 5mls hydrogen peroxide + 5mls CH_3OH ---> 13.11Ug/uL ribulose).

Fructose was produced from the oxidation of xylitol, galactitol, arabitol, inositol, lactitol, and dulcitol with hydrogen peroxide (Table 6, #6, 6b, 18-21). From xylitol (15mls xylitol + 60mls distilled water + 2.5mls H_2O_2 + 0.61mls HCOOH ---> 20.8% solution of fructose + ribulose, ribitol derivatives + glycerol), (CCRC), (Table 6, #6, 6b, 18-21).

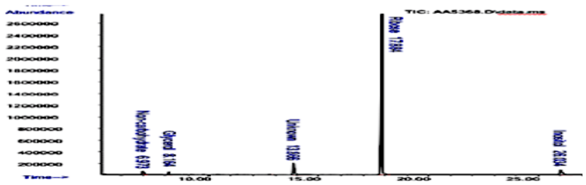


Fig 9, #4) 15mls adonitol + 15mls H2O + 10mls H_2O_2 + 6 drops HCOOH + 4 drops NH_3OH ---> 487.9 ug/mL Ribose + 6.96ug/uL ribulose + 22.81 ug/mL glycerol + non-carbohydrates + unknowns + 2,3,5-tri-O-acetyl-1.4-anhydro-D-ribitol. (CCRC)

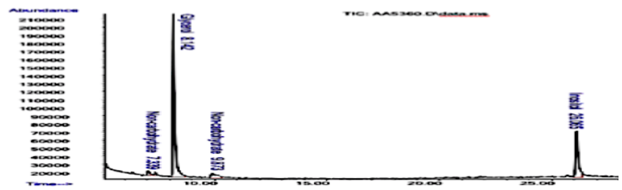


Fig 9, #6) 30mls iced carbonated water + 3 drops HCOOH + 2 drops H_2SO_4 + 10mls CH_3OH ---> 374.2 ug/mL glycerol + non-carbohydrates. (CCRC)

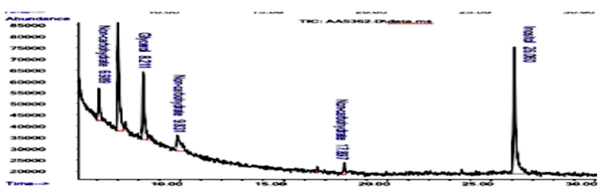


Fig 9, #7) 30mls carbonated water + 0.61mls HCOOH + 10mls CH_3OH + 0.3mls NH_3OH ---> 64.2 ug/mL glycerol + non-carbohydrates. (CCRC).

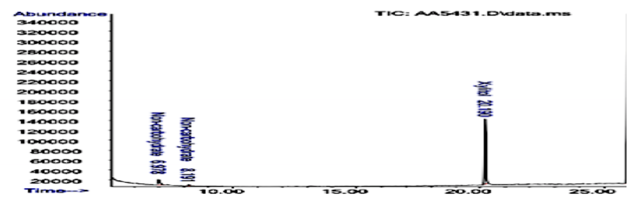
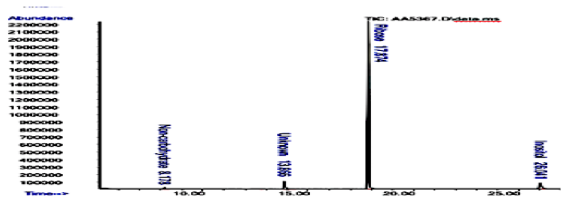
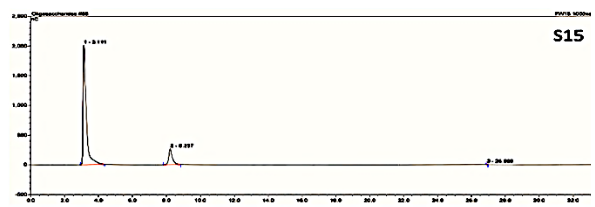


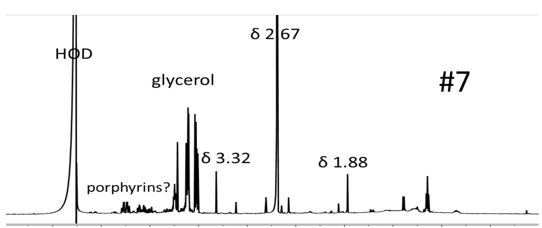
Fig 9, #14) 30mls iced carbonated water + 0.3mls HCOOH + 10mls Ethanol ---> 17 ug/10uL xylitol + noncarbohydrates. (CCRC).



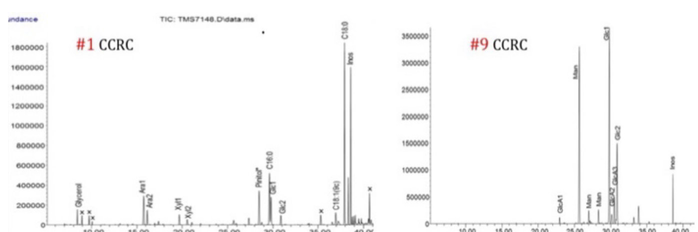
(Fig. 10) 10mls adonitol + 15mls H_2O + 10mls H_2O_2 + 5 drops HCOOH ---> 487.9 ug/mg, Ribose + 31.9 ug/uL, Ribulose + non-carbohydrates + unknowns + 2,3,5-tri-O-acetyl-1,4-anhydro-D-ribitol (CCRC)



(Fig. 10) 15mls Glycerol + 5mls H_2O + 10mls H_2O_2 + 10mls CH_3OH ---> 28.4 ug/uL ribulose (CCRC)



(Fig. 11), (#7 from figure 14) 15mls carbonated water + .03mls $Si(OH)_4$ + 0.1mls H_2SO_4 + 15mls CH_3OH. (CCRC)

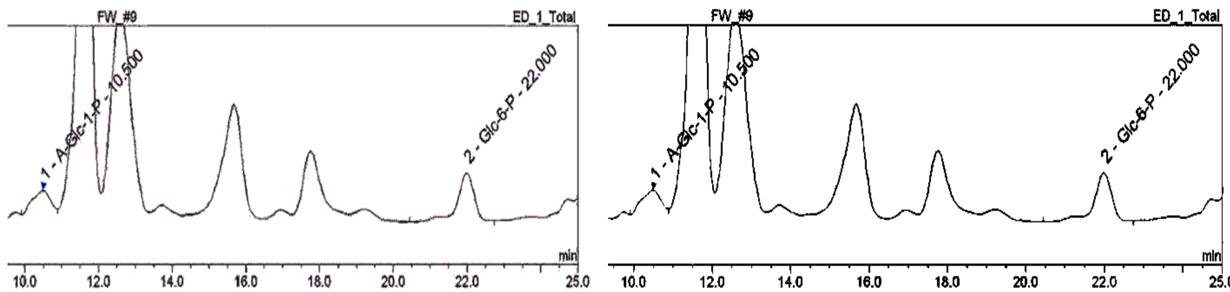


(Fig. 12), (#1, figure 14) 15mls carbonated water + 0.15mls H_2SO_4 + 15mls CH_3OH (#9, figure 14) 15mls carbonated water + .15mls $Si(OH)_4$ + .03mls H_2SO_4 + .06mls oxalic acid + .6mls HCOOH + 15mls CH_3OH. (CCRC)

Glucose 1 & 6-Phosphate was produced from (30mls distilled water + 0.61mls $KSi(OH)_4$ + 30mls glucose + 5mls KOCN + 10mls H_3PO_4 + 2.5mls KOH), (Fig 25), (CCRC). Fructose 6-phosphate was produced from (30mls water + 30mls fructose + 5mls potassium cyanate + 10mls phosphoric acid + 2.5mls KOH/$CaCO_3$), (Fig 13, 14).

<u>Discussion</u>: The synthesis of monosaccharides from the oxidation of sugar alcohols with 3% hydrogen peroxide could possibly give evidence for the necessity of sugar alcohols to at least produce some monosaccharides and to detoxify hydrogen peroxide in the plant (Heldt, 2005).

The phosphorylation of sugars and sugar alcohols could possibly give chemical evidence for the formation of phosphorylated compounds in plants.



(Fig. 13) In both samples' significant amounts of Glc 6-phosphate was detected eluting around ~22 min. Additionally, small amounts of β-Glc 1-phosphate were detected in sample FW_#8 eluting at ~12.9 min as well as small amounts of α-Glc 1-phosphate in sample FW_#9 eluting at ~10.5 min. (CCRC)

(30mls glucose + 30mls water + 5mls phosphoric acid + 5mls potassium cyanate (KOCN) + 1/8tsp Calcium carbonate + 2.5 mls potassium hydroxide (used to raise the pH close to neutral), ($C_6H_{12}O_6 + H_2O + H_3PO_4 + KOCN + CaCO_3 + KOH \dashrightarrow C_6H_{13}O_9P$).

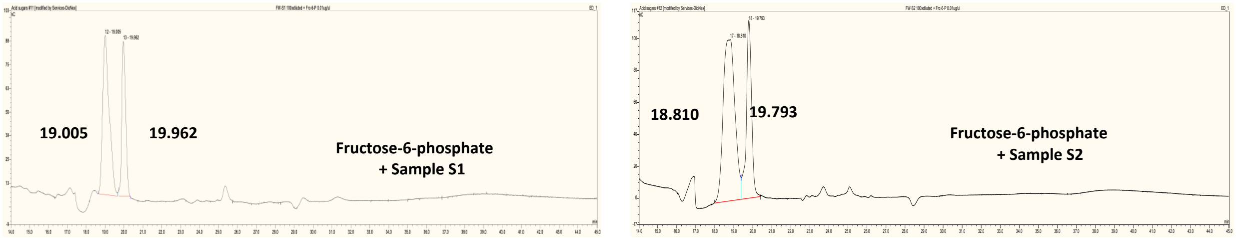
Sample	Glycosyl residue	Mole%
#1	Arabinose (Ara)	55.0
	Xylose (Xyl)	15.0
	Glucose (Glc)	30.0
		100
#7	Xylose (Xyl)	34.0
	Glucose (Glc)	66.0
		100
#9	Glucuronic Acid (GlcA)	20.5
	Mannose (Man)	29.5
	Glucose (Glc)	50.0
		100

In all the tested samples carbohydrate content was estimated as less than 1%. 60mg of dry material was used to prepare the samples for testing.

<u>Sample #1</u>: glycerol, arabinose, xylose, pinitol, glucose, dimethylurea and fatty acids.
<u>Sample #2, #3, #4, #5, #6</u>: Formate
<u>Samples #2, #4, #5, #6, #7</u>: Acetic acid methyl groups
<u>Sample #3</u>: urea, glycerol
<u>Sample #4</u>: Mannose, Glucose, glycerol and Glucuronic acid
<u>Sample #5</u>: Glycerol
<u>Sample #7</u>: Glucose, xylose, glycerol, porphyrins and fatty acids.
<u>Sample #9</u>: Mannose, glucose, N-methylurea and glucuronic acid

<u>Sample #1</u>: 15mls H_2CO_3 + 0.15mls H_2SO_4 + 15 mls CH_3OH.
<u>Sample #2</u>: 15mls H_2CO_3 + 5mls CH_3OH + 0.15mls cyanogen + 0.15mls $KSi(OH)_4$
<u>Sample #3</u>: 15mls H_2CO_3 + 0.61mls $KSi(OH)_4$ + 15mls CH_3OH + 0.15mls KCN + 0.15mls CN_2H_2
<u>Sample #4</u>: 15mls H_2CO_3 + 0.61mls $KSi(OH)_4$ + 15 mls CH_3OH
<u>Sample #5</u>: 15mls H_2CO_3 + 0.61mls $KSi(OH)_4$ + 0.15mls $ZrCO_3$ + 15 mls CH_3OH + 0.15mls KCN
<u>Sample #6</u>: 15mls H_2CO_3 + 0.15mls $KSi(OH)_4$ + 15 mls CH_3OH
<u>Sample #7</u>: 15mls H_2CO_3 + H_2 gas + 0.15mls $KSi(OH)_4$ + 0.17mls H_2SO_4 + 15mls CH_3OH
<u>Sample #9</u>: 15mls H_2CO_3 + 0.15mls $KSi(OH)_4$ + 2 drops H_2SO_4 + 0.61mls oxalic acid + 0.61mls HCOOH + 15mls CH_3OH.

(Fig 15) CCRC

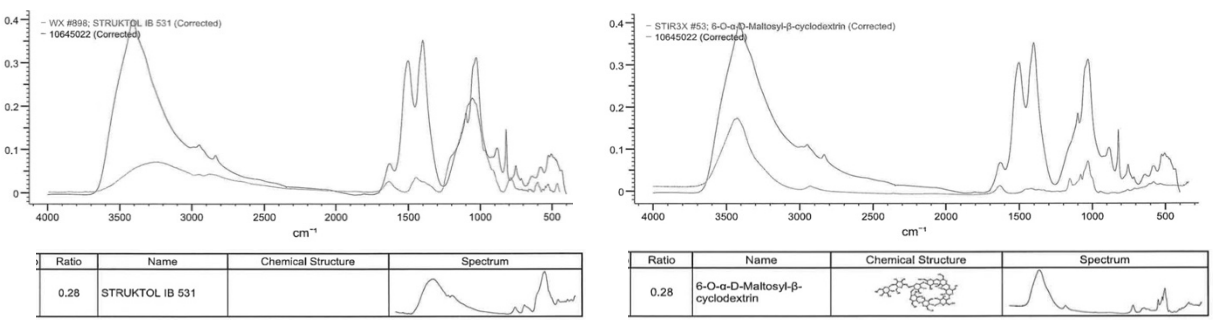


(Fig 14) Sample #1 & 2 were mixed with fructose-6-phosphate standard and separated by CarboPac PA20 column (CCRC).

Abiotic Synthesis of a Cyclodextrin, STRUKTOL, Glycogen and Oxygen from Carbonic Acid and a 1.5-Volt Battery Hooked up to Either Copper or Aluminum Wire Electrodes.

Cyclodextrin (6-O-α-D-Maltosyl-β-Cyclodextrin), (STRUKTOL 1B 531), glycogen and oxygen were synthesized from 60mls warm carbonated water, 0.1mls potassium silicic acid and a 1.5-volt battery hooked up to either aluminum or copper wire electrodes in warm carbonated water (RJ Lee Group), (Creative Proteonics), (Fig. 1, 7, 14-18), (Arnold, 1976), (Porcellinis, 2017).

Plants produce (0.28-volts - 0.626-volts) of electricity and cyanobacteria produce (1.4-volts - 1.5-volts) of electricity through the chemosynthesis or photosynthetic process. Could this electricity produced by plants and cyanobacteria during photosynthesis or chemosynthesis produce these polymers on a micro level from the ionization of aluminum (Al^{3+}) or other metals with carbonic acid in the plant or cyanobacteria ($H_2O + CO_2$ <---> H_2CO_3 + 1.5-volts (e^-) + Al^{3+}---> cyclodextrin + glycogen + H_2O + O_2). Cyclodextrin ($42H_2CO_3$ + 1.5-volts (e^-) + Al^{3+} ---> $Al(C_{42}H_{70}O_{35}) * 7H_2O + 42O_2$). Glycogen ($6H_2CO_3 + Cu^{2+}$ + 1.5-volts (e^-) ---> $Al(C_6H_{10}O_5)_n + H_2O + 6O_2$), was detected using chemical analysis procedures (Creative Proteomics), (Fig. 1, 2, 7, 16-20), (Schmitt, 2016).



(Fig.16) (RJ Lee Group), (12-Volts + 60mls Carbonated Water + 0.31mls NaSH + 0.1mls $KSi(OH)_4$ and Copper wire electrodes

Glycogenesis Metabolism Analysis

Sample name	glycogen content (mg/mL)
polymer	0.266

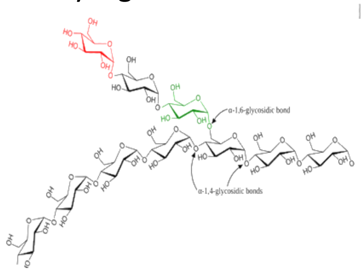
Transfer a 0.2ml sample into tube, add 0.75ml of KOH solution, vortex thoroughly, and maintain at 95^{0}C for 20 minutes, shaking the tube every 5 minutes to ensure mixing. The, dilute the mixture to a total volume of 5ml with distilled water, vortexed and centrifuged at 8,000 g for 10 minutes at 25^{o}C, collect the supernatant sample to each tube separately. Add with 240 ul anthraquinone solution into each tube, incubated for 10 minutes at 95^{0}C, cooled down to room temperature. Transfer 0.2ml solution vortexed and the absorbance value was determined at 620nm.

(Fig.17) Creative Proteonics, (12-Volts + 60mls Carbonated Water + 0.31mls NaSH + 0.1mls $KSi(OH)_4$. Copper wire electrodes

Materials: 1.5-volt battery, 2-volt DC transformer, 12-volt battery, 6-volt AC transformer, sodium hydrosulfate, silicic acid, methanol, warm carbonated water, warm ocean water, warm distilled water with sodium chloride, sodium chloride, copper wire, steel wire, stainless-steel wire, magnesium wire and aluminum wire. Carbon dioxide in water was replicated with warm carbonated water, warm ocean water or warm distilled water with sodium chloride added to produce these polymers from carbonic acid and low voltage electricity. Carbonated water contains approximately 3 - 7 grams of carbon dioxide per liter, distilled water contains approximately 1.7 - 2 grams of carbon dioxide per liter and ocean water contains over 1.45 grams of carbon dioxide per liter of water.

Methods: Copper, steel, aluminum, magnesium or other metal wire electrodes hooked up to a 1.5-volt or 12-volt battery placed inside a 240ml mason jar filled with either warm carbonated water, warm ocean water or warm distilled water with sodium chloride added (Fig 1).

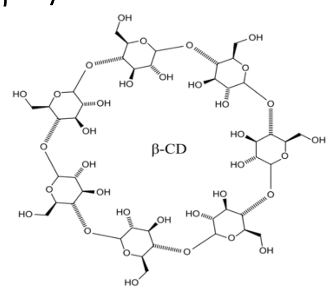
Glycogen Structure



α(1--->4)-glycosidic and α(1--->6)-glycosidic linkages. core protein of glycogenin is surrounded by branches of glucose units.

(Fig.18)

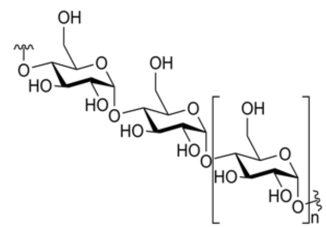
β-Cyclodextrin Structure



β-Cyclodextrin; 7 glucose subunits. ($42H_2CO_3$ + 1.5-volts + Al^{3+} ---> $Al(C_{42}H_{70}O_{35})$ * $7H_2O$ + $42O_2$).

(Fig.19)

Starch Structure



Amylose is a linear polymer of glucose mainly linked with α(1-->4) bonds. It is one of the two components of starch, the other being amylopectin. $(C_6H_{10}O_5)_n$

(Fig.20)

Results: Cyclodextrin, (STRUKTOL 1B 531), glycogen and oxygen were abiotically produced from 45mls warm carbonated water, 0.3mls sodium hydrosulfide, 0.1mls silicic acid and a 1.5-volt or 12-volt battery hooked up to aluminum wire electrodes in either warm carbonated water, warm ocean water or warm distilled water with sodium chloride added (Fig. 1, 7, 16-20), (Creative Proteonics), (RJ Lee Group). Polymers were also produced from; 1) Warm carbonated water, methanol, a 12-volt battery and copper electrodes. 2) Warm carbonated water, cyanide, sodium hydrosulfate, a 12-volt battery and aluminum wire electrodes. 3) Ocean water, a 1.5-volt battery and aluminum wire electrodes. 4) Warm carbonated water, silicic acid, a 1.5-volt battery and aluminum wire electrodes. 5) 45mls warm distilled water, 0.3mls silicic acid, 0.6mls sodium chloride, a 1.5-volt battery and copper wire electrodes. 6) 1.5-volt battery, carbonated water, potassium silicic acid, sodium hydrosulfide and aluminum wire electrodes. 7) Warm ocean water, aluminum wire electrodes and a 1.5-volt battery. 8) Warm distilled water, 0.6mls NaCl, 1.5-volt battery and aluminum wire electrodes. Copper electrodes produced a blue/green polymer and aluminum electrodes produced a white polymer (Fig. 7, 14-18). Yields were significantly higher using a 12-volt battery and by adding sodium chloride.

Discussion: Could the abiotic synthesis of (6-O-α-D-Maltosyl-β-Cyclodextrin), STRUKTOL, glycogen and oxygen from the electrolysis of aluminum wire electrodes hooked up to a 1.5-volt battery in warm carbonated water, or warm ocean water, or warm distilled water with sodium chloride added open up a new prospective on the physiology of plant growth. Questioning if the electrolysis of aluminum (Al^{3+}) or other metals inside the plant or cyanobacteria from the electricity produced by the plant or cyanobacteria during chemosynthesis and photosynthesis is capable of producing these polymers from carbonic acid (Fig. 7), (Arnold, 1976). ($H_2CO_3 + Al^{3+}$ + 1.5-volts (e^-) ---> cyclodextrin + glycogen + $H_2O + O_2$).

Using an AC transformer or stainless wire did not produce any noticeable polymers (Shlosberg, 2022), (Arnold, 1976). Polymer yields were much higher using sodium chloride in carbonated water or distilled water. Using a 12-volt battery greatly increased yields.

Abiotic Synthesis of Acetone from Ammonia and Formic Acid, Ammonia and Acetic Acid or Ammonia and Methanol

Acetone (CH_3COCH_3) was produced from; 1) Methanol and ammonia. 2) Formic acid and ammonia. 3) Acetic acid and ammonia. Showing how easily acetone could be produced by plants, possibly accounting for acetones emission from plants. ($3HCOOH + NH_3OH$ ---> C_3H_6O + $2H_2O + 2O_2$), ($4CH_3OH + 2NH_3OH + H_2O$ ---> $2C_2H_6O + 5H_2O$), ($C_2H_4O_2 + 3NH_3OH$ ---> C_2H_6O + $4H_2O$).

Materials: Carbonated water, distilled water, sodium and potassium silicate, formic acid, ammonia, methanol and acetic acid.

Methods: Mixing distilled water and ammonia with either formic acid, acetic acid or methanol to produced acetone.

Acetone	**Isopropyl** ug/L	**CH_4** ug/L	**Methanol** ug/mL	**Acetone** ug/L MRL 1000	**Ribulose** Ug/uL	**Glycerol** ug/mg
1) No gasses. 30mls carbonated water + 15 drops $NaSi(OH)_4$ + 2.5 mls acetic acid + 10 mls NH_3 + 0.6mls $NaSi(OH)_4$ + 1`5 mls NH_3. pH 7	ND	ND		44000 D		
2) 7oz carbonated water + 9 drops $NaSi(OH)_4$ + 2mls HCOOH + 17.5mls NH_3. pH 7			ND	220 ppb		
3) 30mls water + 0.6mls $NaSi(OH)_4$ + 2mls HCOOH + 60mls NH_3. pH 7				13000000 D		
4) 45mls Carbonated water + 0.6mls $NaSi(OH)_4$ + 2.5mls HCOOH + 30mls NH_3	ND	ND	0.63	49000 D		
5) 30mls water + 5mls acetic acid + 2.5mls NH_3OH 6-21				320		
6) 30mls water + 15mls dilute $NaSi(OH)_4$ + 2mls HCOOH + 5mls NH_3OH ALS 11-20				1200		
7) 30mls H_2O + 20 drops HCOOH + 5mls NH_3				1400		
8) 30 mls CH_3OH + 10 mls H_2O_2 + 0.6mls NH_3				2200		
9) 40mls CH_3OH + 0.1mls NH_3OH				5400		
10) Fig 16, #18) 25mls formamide + 5mls acetone + 10mls H_2O_2					31.8	
11) 30mls cold carbonated water + 0.61mls HCOOH + 10mls acetone						709.2
Dilute: 8oz H_2O + 5mls $KSi(OH)_4$ or 5mls $NaSi(OH)_4$						

(Table 7)

Results: Acetone was produced from; 1) Formic acid, distilled water and ammonia (30mls H_2O + 1.8mls HCOOH + 5mls NH_3OH ---> 1,400ug/L of acetone). 2) Methanol, distilled water and ammonia (30mls H_2O + 5mls CH_3OH + 0.61mls NH_3OH ---> 5,400ug/L of acetone). 3) Acetic acid, distilled water and ammonia (30mls water + 5mls CH_3CHOOH + 2.5mls NH_3OH ---> 320ug/L of acetone + unknowns), (Table 7).

When acetone was added to carbonated water and formic acid, 709.2ug/mg of glycerol was produced (Table 7, #11), (Table 4, #14, 14c), (CCRC). When acetone was added to glycerol and hydrogen peroxide, ribulose was produced (30mls glycerol + 30mls distilled water + 10mls acetone + 10mls hydrogen peroxide + 0.61mls formic acid ---> 14.2ug/mg of ribulose + monosaccharides (CCRC). Showing a possible biochemical role for acetone for the formation of glycerol, ribulose, non-carbohydrate intermediates and unknowns.

Discussion: Do plants produce acetone for a physiological purpose? (Fincheira 2018). The chemical evidence more than suggests that they do, thus possibly explaining acetones diurnal emission from plants.

Abiotic Synthesis of Ethanol and Isopropyl Alcohol.

Ethanol (CH_3CH_2OH) was produced from distilled water, dilute sodium silicic acid, phosphoric acid, calcium carbonate and sodium hydrosulfide (Table 9, #11-12), ($2CaCO_3 + H_2O + 2H_3PO_4 + 2NaSH \dashrightarrow C_2H_6O + H_2O + 6O_2 + 2P + 2Na + 2S + 2Ca$). Isopropyl alcohol ($C_3H_8O$) was produced from a 12-volt battery, carbon monoxide, carbonated water, hydrochloric acid, dilute $NaSi(OH)_4$ and sodium hydrosulfide (Table 9, #13).

Isopropyl alcohol was shown to produce non-carbohydrates when added to carbonated water and formic acid (Table 9, #13). Ethanol produced xylitol and non-carbohydrates when added to carbonated water and formic acid (CCRC).

Materials: Carbonated water, distilled water, dilute sodium silicic acid, phosphoric acid, sodium hydrosulfide, hydrogen peroxide, formic acid, methanol and calcium carbonate.

Methods: Mixing order, pH and temperature of the carbonated water and distilled water all influenced the final results.

Date: 10-1-18, 11-14-18, 1-4-19 and 4-2-21 ALS	CH_2O ug/L	HCOOH mg/L	CH_4 ug/L	CH_3OH ug/L	Acetone ug/L	Acetic acid mg/L
1) CO, 240mls carbonated water + 2.5mls $NaSi(OH)_4$ + 0.3mls NaHS + 0.25mls HCL + 0.3mls H_2SO_4	ND	ND	ND	ND	ND	ND
2) CO,12 volt. 7 oz H_2CO_3 + 0.6mls $NaSi(OH)_4$ + 0.5mls H_2SO_4 + 0.2mls HCl + 0.15mls KCN. Base NaSH 0.15mls + 0.1mls NH_3 + 0.15mls FeCN + 0.1mls $NaSi(OH)_4$ + 0.6mls $KHCO_3$.	ND	370	1.6	ND		1
3) CO gas, No 12 volt, no NaSH. 0.15mls NH_3 + 0.15mls $NaSi(OH)_4$ pH 6.6	ND	10	ND	ND		ND
4) 210mls rain water + 0.6mls $NaSi(OH)_4$ + 0.5mls H_2SO_4 + 0.3mls HCL + NaSH 0.15mls + 0.1mls $NaSi(OH)_4$ + 0.1mls NH_3	ND	9.1	ND	ND		1.2
5) 12-Volt, CO. 7oz Carbonated water + 0.6mls $NaSi(OH)_4$ + 0.3mls H_2SO_4 + 0.1mls HCL + 0.15mls tsp KCN + 0.15mls $FeCO_3$, $NiCO_3$, $CuCO_3$, AlOH, $KHCO_3$ + 0.3mls H_2SO_4 + 0.3mls $KSi(OH)_4$ + 0.2mls NH_3	ND	100	ND	ND		2
Dilute: 240mls H_2O + 5mls $KSi(OH)_4$ or 5mls $NaSi(OH)_4$						

(Table 8)

Results: Ethanol was produced from (60mls distilled water + 0.61mls dilute $NaSi(OH)_4$ + 0.3mls H_3PO_4 + 0.61mls $CaCO_3$ + 0.3mls NaSH ---> 1600ug/L of ethanol), (Table 9, #11-12, ALS). Without sodium hydrosulfide no ethanol was produced (Table 9). Ethanol produced non-carbohydrates and xylitol when mixed with carbonated water and formic acid (Anresco, CCRC).

Isopropyl alcohol was produced from (12-volts + CO + 130mls carbonated water + 0.61mls HCL + 0.61mls dilute $NaSi(OH)_4$ + 0.61mls NaSH ---> 26ug/L of isopropyl), (ALS). Isopropyl alcohol was found to produce non-carbohydrates (30mls iced carbonated water + 0.61mls HCOOH + 10mls isopropyl ---> non-carbohydrates), (CCRC).

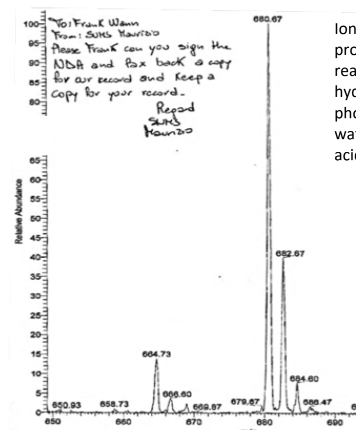
<u>Discussion</u>: Methanol and isopropyl produced more oxygen than ethanol, while butanol produced little too no oxygen (Table 5). However, more work will be required to prove this and the exact biochemical purpose of alcohol in plants, if any.

Abiotic Synthesis of Acetic Acid from Formic Acid, Methanol and Hydrogen Peroxide.

Acetic acid (CH_3COOH) was abiotically produced from; air bubbled distilled water, formic acid/methanol, potassium hydroxide and hydrogen peroxide (Table 9, 1-10), (ETS Analytical). From formic acid ($2HCOOH + H_2O + 3KOH + H_2O_2$ ---> $CH_2COOH + 4H_2O + 2O_2$). From methanol ($2CH_3OH + H_2O + 2KOH + H_2O_2$ ---> $CH_2COOH + 5H_2O$), (Table 9, #2, 4, 9).

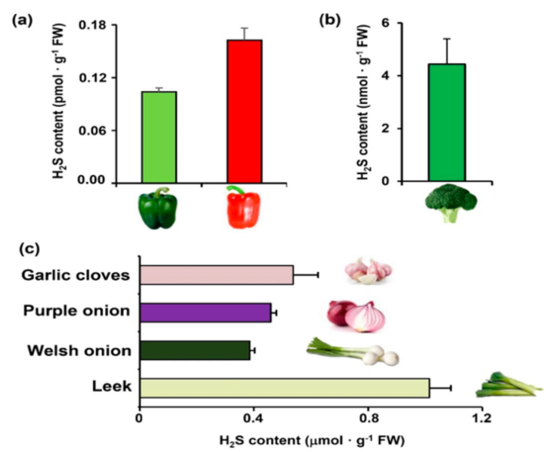
Acetic Acid, Ethanol & Isopropyl	Acetic acid g/L	Ethanol Ug/L	Iso propyl
1) 60mls air bubbles water + 0.61mls HCOOH + 0.31mls KOH + 15mls H_2O_2	0.2		
2) 60mls air bubbled water + 0.6mls CH_3OH + 15mls H_2O_2	0.17		
3) 60mls air bubbled water + 0.6mls HCOOH + 15mls H_2O_2	0.18		
4) 60mls air bubbled water + 0.6mls CH_3OH + 0.6mls HCOOH + 0.3mls KOH + 15mls H_2O_2	0.19		
5) 60mls air bubbles water + 0.6mls CH_3OH + 0.6mls HCOOH + 15mls H_2O_2	0.16		
6) 60mls air bubbled water + 2.5mls dilute KSi(OH)4 + 0.3mls NaThioSulfate + 0.6mls HCOOH + 15mls H_2O_2	0.17		
7) 60mls air bubbled water + 0.6mls HCOOH + 0.6mls CH_3OH + 2.5mls dilute KSi(OH)4 + 15mls H_2O_2	0.18		
8) 60mls air bubbled water + CH_4 + 0.65mls HCOOH + 0.3mls KOH + 15mls H_2O_2	0.21		
9) 60mls air bubbled water + 1.25mls CH_3OH + 0.31mls KOH + 30mls H_2O_2	0.30		
10) 60mls air bubbled water + 1.25mls HCOOH + 0.3mls KOH + 30mls H_2O_2	0.23	Below MRL	
11) 60mls water + 0.6mls NaSi(OH)4 + 0.25mls H_3PO_4 + 0.55mls $CaCO_3$		340	
12) 30mls water + 0.7mls $NaSi(OH)_4$ + 0.25mls H_3PO_4 + (0.61mls $CaCO_3$ & 0.3mls NaSH)		1600	
13) CO, 12volt. 75mls carbonated water + 0.6mls HCL + 0.6mls $NaSi(OH)_4$ + 0.61mls NaSH			26
14) 40mls H_2O + 0.2mls $NaSi(OH)_4$ + 0.3mls H_3PO_4 + 0.3mls $CaCO_3$		ND	
15) 40mls cold H_2CO_3 + 0.1mls dilute $NaSi(OH)_4$ + 0.3mls H_3PO_4 + 0.61mls $CaCO_3$		ND	
16) 40mls Cold H_2CO_3 + 0.3mls H_3PO_4 + 0.5mls $CaCO_3$ 11/23/21		ND	
17) 40mls H_2O + 3 drops H_3PO_4 + (0.61mls $CaCO_3$ & 0.3mls NaSH)		ND	
18) 40mls Carbonated water + 0.2mls H_3PO_4 + (0.61mls $CaCO_3$ & 0.3mls NaSH)		ND	
Dilute: 240mls H_2O + 5mls $KSi(OH)_4$ or 5mls $NaSi(OH)_4$			

(Table 9)



Ionized silicic acid; produced from reacting calcium hydroxide with phosphoric acid in water and silicic acid. (Stanford)

(Fig 21)



(Fig.22). Endogenous H_2S content (Munoz-Vargas, 2022).

Materials: Carbonated water, air bubbled distilled water, methanol, formic acid, 3% hydrogen peroxide and potassium hydroxide.

Methods: 24-hour mass spectrometry results were obtained from ETS Laboratories to eliminate fermentation as the mechanism for producing acetic acid. One sample was tested a week later with the same results; providing more evidence that fermentation was not involved in the formation of acetic acid in any of the samples tested.

Results: Acetic acid was produced from methanol, formic acid, potassium hydroxide and hydrogen peroxide (60mls H_2O + (1.23mls CH_3OH and or HCOOH) + 0.61mls KOH + 15mls H_2O_2 ---> 0.3g/L of CH_3COOH), (Table 9), (ETS analytical). Raising the pH with potassium hydroxide increased the yields.

Acetic acid and ammonia produced acetone (30mls distilled water + 5mls acetic acid + 2.5mls NH_3OH ---> 320ug/L acetone), (Table 7, #5). Acetic acid was found to produce glucose and monosaccharides when substituted for formic acid.

Discussion: Raising the pH of the solution aided in the formation of acetic acid. In the experiments that did not use potassium hydroxide, the yields of acetic acid were substantially reduced. Substituting methanol for formic acid resulted in the same yields of acetic acid produced.

Monosaccharides were formed when sugar alcohols were added to hydrogen peroxide, methanol and acetic acid.

Hydrogen peroxide was added last in all the experiments to produce acetic acid. Could the formation of acetic acid be another means to detoxify hydrogen peroxide.

The Abiotic Synthesis of Amino Acids.

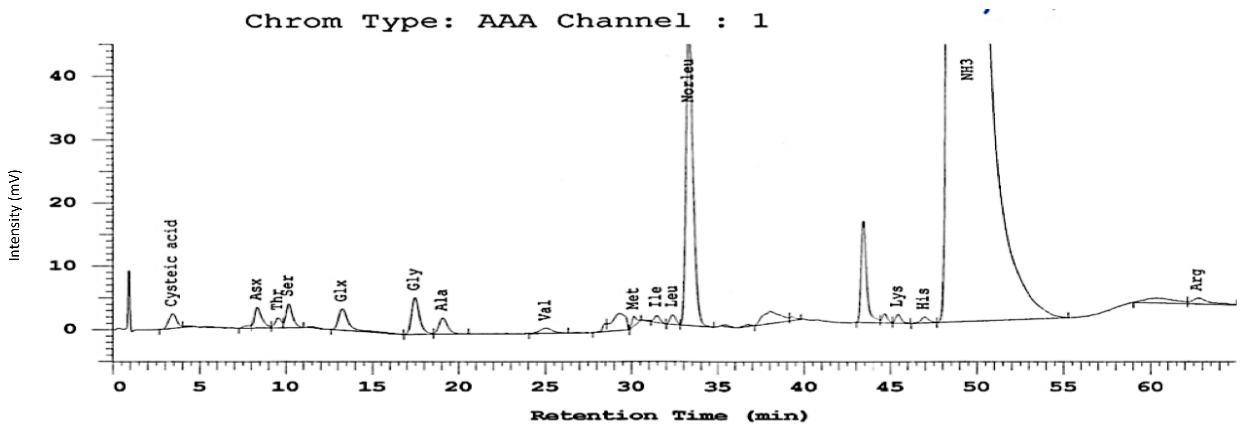
Amino acids were produced from nitriles, ammonia and nitrogen; 1) nitrogen gas, phosphoric acid and calcium carbonate (Table 2), (Fig. 23, 24), (UC Davis). 2) From ionized silicic acid, formaldehyde, potassium cyanide and ammonia (Fig. 6), (Stanford). 3) Carbonated water, nitrogen, propane, potassium cyanide, and sodium hydrosulfide.

Materials: Distilled water, carbonated water, nitrogen, silicic acid, 12-volt battery, ammonia, cyanide, cyanate, calcium carbonate, phosphoric acid, hydrogen and sulfuric acid.

Methods: Producing amino acids from carbonated water, ammonia, nitriles and nitrogen gas. Mixing carbonated water, distilled water, nitrogen, dilute silicic acid, ammonia and cyanide containing compounds; producing amino acids and other unknowns.

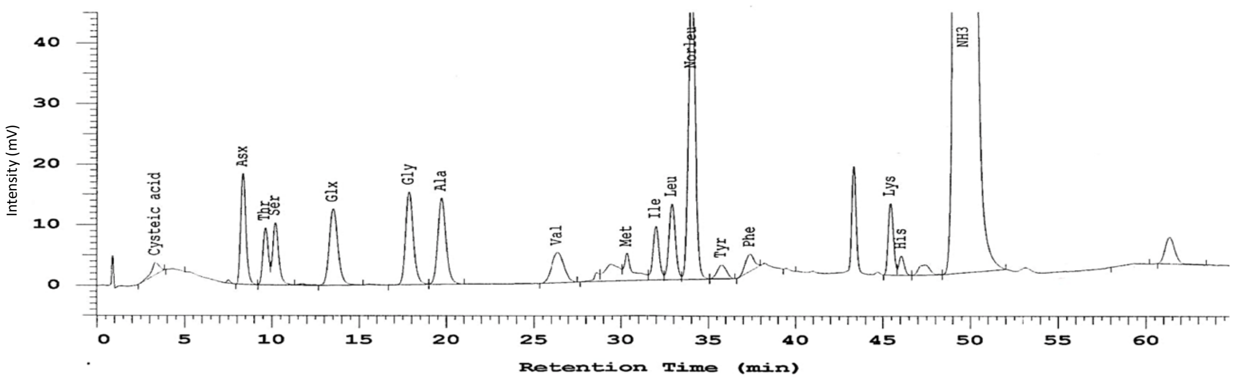
Results: Amino acids were synthesized from; 1) Nitrogen gas bubbled into distilled water, phosphoric acid and calcium carbonate (N_2 + H_2 + distilled water + H_3PO_4 + $CaCO_3$ ---> amino acids, ammonia and nitrates (Fig 21), (UC Davis). 2) From cyanide (Carbonated water + KCN + NaSH ---> formic acid + amino acids), (Table 2, #1-16), (Fig. 23, 24), (UC Davis, Anresco). 3)

(Distilled water + CH_2O + NH_3 + KCN + ionized silicic acid ---> Fig. 6), (Stanford).



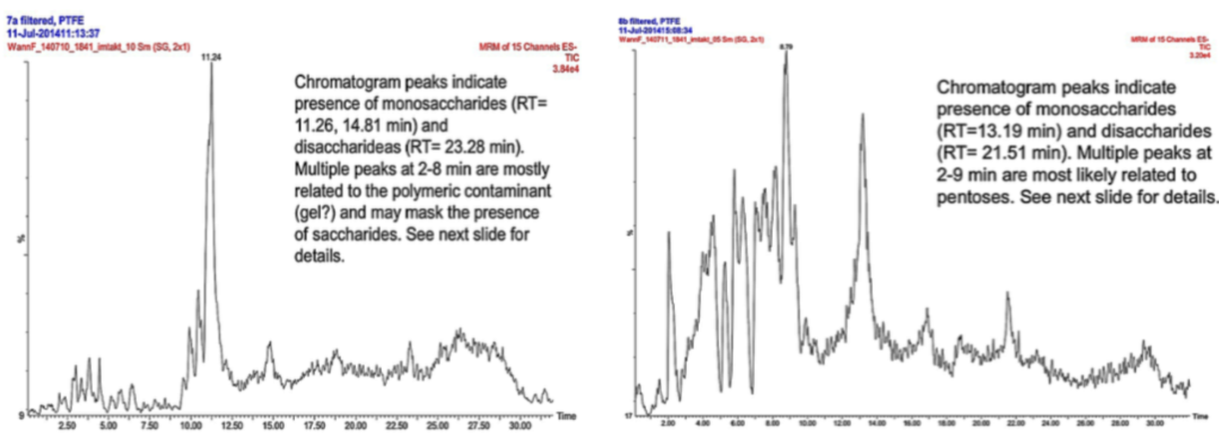
(Fig 23) UC Davis, Molecular Structure Facility

(3,000mls Carbonated Water + N_2 + H_2 + propane + 9.9mls HCN + 31mls NaSH), (sample concentrated to 12 ounces)



(Fig. 24) UC Davis, Molecular Structure Facility

90mls Water + N_2 gas + 0.01mls H_3PO_4 + 0.61mls $CaCO_3$



Non-ionized silicic acid + formaldehyde #7
Stanford

Ionized Silicic acid + Formaldehyde 8a
Stanford

(Fig.25)

Discussion: Amino acids were produced from nitrogen gas, ammonia and nitriles added to some of the experiments. Contamination of the samples sent to UC Davis for amino acid analysis is probable, especially considering using a rotary vacuum evaporator to concentrate one sample for mass spectrometry analysis (Fig. 23, 24). Could the unknowns from synthesizing formic acid utilizing a 12-volt battery, carbonated water, cyanide and sodium hydrosulfide be amino acids? (H_2CO_3 + KCN + ($H_2S_{(aq)}$ <---> $2H^+$ + $2HS^-$) ---> HCOOH + unknowns).

Final Discussion: The present model of photosynthesis is hypothesized as utilizing light as an energy source to convert carbon dioxide into glucose (CO_2 + $2H_2A$ + *hv* ---> $(CH_2O)_n$ + 2A + $2H_2O$), ($6CO_2$ + $6H_2O$ + *hv* ---> $C_6H_{12}O_6$ + $6O_2$ + 18ATP + 12NADH). Anerobic photosynthesis ($6CO_2$ + $12H_2S$ + *hv* ---> $C_6H_{12}O_6$ + $6H_2O$ + 12S).

The origin of life chemistry is hypothesized as originating from either hydrothermal vents or warm primordial soup pools through the chemosynthesis process (CO_2 + $3H_2S$ + O_2 ---> CH_2O + 3S + $2H_2O$). Theorized as (CO_2 + H_2O <---> H_2CO_3 + $2H_2S_{(aq)}$ ---> CH_2O + $2H_2O$ + 2S), utilizing hydrogen sulfide as the energy source to produce formaldehyde, formic acid and unknowns.

The evidence provided may prove that the origin of life chemistry and the chemical mechanism of chemosynthesis and photosynthesis begin from carbonic acid from carbon dioxide in water (H_2O + CO_2 <---> H_2CO_3), which reacts with atmospheric gasses methane, methanol, cyanide, ammonia, silicic acid, sodium chloride, urea, 1.5-volt battery, aluminum and hydrogen sulfide in aqueous form. Producing formaldehyde, formic acid, methanol, glycerol, oxygen, amino acids, glycogen, cyclodextrin and unknowns from carbonic acid (H_2O + CO_2 <---> H_2CO_3 + atmospheric gasses and compounds + 1.5-volt battery (e^-) + Al^{3+} ---> formaldehyde, formic acid, methanol, glycerol, oxygen, cyclodextrin, glycogen and unknowns). From these initially produced compounds from carbonic acid; amino acids, fatty acids, monosaccharides, ribose, ribulose, nucleosides, acetic acid, nucleotides, glycolic acid, lactic acid, stearic acid, palmitic acid, methane, glycogen, porphyrins and more were produced. Possibly replicating the chemistry of the origin of life, chemosynthetic and photosynthetic processes (Stanford's mass spectrometry department), (Complex Carbohydrate Research Center), (Anresco), (ALS), (ETS), (Avomeen Analytical), (RJ Lee Group), (R&L Analytical), (SDK Analytical).

Carbon dioxide in water was replicated with carbonated water, ocean water or distilled water with sodium chloride added. Carbonated water contains approximately 3 - 7 grams of carbon dioxide per liter, distilled water contains approximately 1.7 - 2 grams of carbon dioxide per liter and the ocean contains at least 1.45 grams of carbon dioxide per liter. The ocean absorbs approximately 30% of all the carbon dioxide released into the atmosphere.

Sodium hydrosulfide was used to replicate hydrogen sulfide in aqueous form to produce formaldehyde, formic acid and other unknowns from bisulfide (HS^-), (Fig. 3), ($H_2S_{(aq)}$ <---> H^+ + HS^-), ($NaSH_{(aq)}$ <---> Na + HS^-).

Formaldehyde was produced from carbonic acid from warm carbonated water and sodium hydrosulfide (H_2O + CO_2 <---> H_2CO_3 + {$H_2S_{(aq)}$ <---> $2H^+$ + $2HS^-$} ---> CH_2O + $2H_2O$ + 2S). Formaldehyde was found to produce; methanol, formic acid, glycerol and unknowns (Table 1-4).

Formic acid was produced from carbonic acid from carbonated water or ocean water, cyanide and sodium hydrosulfide (H_2O + CO_2 <---> H_2CO_3 + KCN + [NaSH <---> Na + HS^-] ---> HCOOH + unknowns), (Ocean water + KCN + ($H_2S_{(aq)}$ <---> H^+ + HS^-) <---> HCOOH + unknowns).

Formic acid was also produced from formaldehyde. Formic acid was found to produce acetic acid, acetone, glycerol, rhamnose, monosaccharides and unknowns (Table 1-3).

Plants emit from 0.9ppm up to 9ppm of hydrogen sulfide from their leaves. Could this hydrogen sulfide produced by plants be the predominate means for fixing carbonic acid into formaldehyde, formic acid and unknowns in the plant? (Fig. 4, 15), (Munoz-Vargas, 2022), (Wilson, 1978), (Olson, 2015). Research has shown that by increasing the hydrogen sulfide concentrations to plants is beneficial for growth, however, very little is known about hydrogen sulfide and if it has a role in plant physiology.

Methanol was produced from carbonic acid from carbonated water and methane or propane ($H_2O + CO_2 \text{<--->} H_2CO_3 + CH_4 + H_2O \text{--->} 2CH_3OH + O_2$), and from formaldehyde. Methanol was found to produce formic acid, glycerol, sugar alcohols, monosaccharides, acetone, glucose, ribose, ribulose and acetic acid (Table 4, 7, 9). Plants produce roughly 10-45 percent of the total global methane produced in the atmosphere (Nisbet, 2009), (Covey, 2018). Could this methane produced by the plant be a source for producing methanol from carbonic acid in the plant.

Glycerol was produced from carbonic acid from cold carbonated water and methanol ($H_2O + CO_2 \text{<--->} 2H_2CO_3 + CH_3OH \text{--->} C_3H_8O_3 + 2O_2$), and from formaldehyde (Table 1). Glycerol was found to produce rhamnose, ribulose, ribose, oxygen, carbohydrate intermediates, glycerol phosphates and non-carbohydrates (CCRC, ALS, Anresco, R&L Analytical and SDK labs). The evidence provided shows that glycerol and sugar alcohols could have a role to produce monosaccharides such as rhamnose, fructose, xylose, glucose, fructose, maltose, ribose, ribulose and more when glycerol and sugar alcohols were oxidized with hydrogen peroxide (Table 6). Could the oxidation of sugar alcohols with hydrogen peroxide into monosaccharides and unknowns be a viable means to detoxify hydrogen peroxide in plants?

Oxygen was produced from carbonic acid from carbonated water and methanol, which also produced glycerol ($H_2O + CO_2 \text{<--->} 2H_2CO_3 + CH_3OH \text{--->} C_3H_8O_3 + 2O_2$). Oxygen was also produced from mannitol, inositol, dulcitol, glycerol and from producing glycogen and cyclodextrin from carbonic acid and a 1.5-volt battery (Table 5), (R&L Analytical), (RJ Lee Group).

Cyclodextrin, 6-O-α-D-Maltosyl-β-Cyclodextrin, STRUKTOL 1B 531, glycogen and oxygen were artificially produced from carbonic acid, silicic acid and a 1.5-volt battery hooked up to aluminum or metal wire electrodes in a mason jar filled with either warm carbonated water, warm ocean water or warm distilled water with sodium chloride added (Fig. 1, 7, 16-20), (Creative Proteomics), (RJ Lee Group). Plants produce (0.28-volts - 0.626-volts) of electricity and cyanobacteria produce (1.4-volts – 1.5-volts) of electricity derived from the chemosynthesis and photosynthetic process. Could this electricity produced by plants and cyanobacteria during the chemosynthesis and photosynthetic process produce these polymers from the ionization of aluminum (Al^{3+}) and carbonic acid inside the plant or cyanobacteria on a micro level (H_2CO_3 + 1.5-volts (e^-) + Al^{3+}---> cyclodextrin + glycogen + H_2O + O_2).

From these initially produced compounds from carbonic acid; formaldehyde, formic acid, methanol, oxygen, glycerol, cyclodextrin, glycogen, amino acids and unknowns; stearic acid, palmitic acid, acetic acid, glycogen and porphyrins were produced (Stanford's mass spectrometry department), (Complex Carbohydrate Research Center), (Anresco), (ALS), (ETS), (Avomeen Analytical), (RJ Lee Group), (R&L Analytical).

Glucose was produced from the oxidation of either mannitol, sorbitol or dulcitol with 3% hydrogen peroxide (Table 6, #8-11, 22, 23). Fructose was produced from the oxidation of xylitol, lactitol, inositol, dulcitol and D-arabitol with hydrogen peroxide (Table 6, 8-11, 21-23). Maltose was produced from the oxidation of inositol and maltitol with hydrogen peroxide (Table 6, #12, 17, 18).

Glucose-1-phosphate both alpha and beta, fructose-6-phosphate and glycerol 1, 2 and 3-phosphate were produced from ([30mls glucose/fructose/glycerol] + 30mls distilled water + 10mls phosphoric acid + 5mls potassium cyanate + 2.5mls potassium hydroxide or calcium carbonate), (Fig 8, 13, 14). Phosphates of glycerol, glucose and fructose were all produced by this same chemistry, which may be the same for all sugar phosphates. Possibly enlightening the biochemistry of sugar phosphates in plants.

Attempting to replicate the complexity of the origin of life chemistry, chemosynthesis and photosynthesis was possibly demonstrated from the following experiments: 1) (3,000mls carbonated water + 12-volts + N_2 + propane + 10mls KCN + 31mls NaSH ---> formic acid, ribose, ammonia and amino acids). This sample was concentrated to 120mls with a rotary vacuum evaporator (Fig. 23, 24), (UC Davis, Stanford, ALS and Anresco). 2) (Distilled water + N_2 + H_3PO_4 + $CaCO_3$ ---> amino acids + ammonia + nitrates + organic acids). 3) (Distilled water + ionized silicic acid + CH_2O + KCN + NH_3 ---> amino acids, fatty acids, lactic acid, glycolic acid, porphine and more were produced), (Fig. 6, 21, 25), (Stanford).

Many of the experimental results could be inaccurate due to numerous known and unknown factors: 1) The lag time between performing the experiments and test results. 2) MRL of the chemical being tested. 3) If the mass spectrometry machines were calibrated for one specific chemical. 4) Testing procedures. 5) Contamination. 6) Using a rotary vacuum evaporator. 6) The temperature of the carbonated water, distilled water, ocean water or chemicals used. 7) Unknowns. 8) pH of the solutions. 9) Order that the chemicals were added to the mix. 10) The higher the voltage the greater the yields of cyclodextrin and glycogen polymers that were produced. Nothing should be taken at face value and that there is a daunting amount of work that needs to be done.

Summary: Chemosynthesis, photosynthesis and the replication of the origin of life chemistry are all hypothesized as based upon carbonic acid from carbon dioxide in water ($CO_2 + H_2O$ <---> H_2CO_3) to produce formaldehyde, formic acid, methanol, glycerol, oxygen, cyclodextrin, glycogen and unknowns when carbonated water was added to atmospheric gasses and compounds; methane, methanol, hydrogen sulfide, ammonia, and other early earth compounds such as cyanide, silicic acid, sodium chloride, urea and a 1.5-volt battery that was used to replicate the electricity produced by plants and cyanobacteria.

Formaldehyde was produced from warm carbonated water and sodium hydrosulfide. ($H_2O + CO_2$ <---> H_2CO_3 + {$H_2S_{(aq)}$ <---> $2H^+ + 2HS^-$} ---> $CH_2O + 2H_2O + 2S$). Formaldehyde was found to produce formic acid, methanol, glycerol and unknowns

Formic acid was produced from carbonated water, cyanide and sodium hydrosulfide ($H_2O + CO_2$ <---> H_2CO_3 + KCN + {$H_2S_{(aq)}$ <---> $2H^+ + 2HS^-$} ---> HCOOH + unknowns). Formic acid was found to produce acetic acid, acetone rhamnose, glycerol, monosaccharides, and unknowns.

Methanol was produced from carbonated water and methane ($H_2O + CO_2$ <---> $H_2CO_3 + CH_4 + H_2O$ ---> $2CH_3OH + O_2$). Methanol was found to produce acetic acid, oxygen, monosaccharides, ribulose, sugar alcohols, glucose, glycerol and acetic acid derivates.

Glycerol and oxygen were produced from cold carbonated water and methanol ($H_2O + CO_2$ <---> $2H_2CO_3 + CH_3OH$ ---> $C_3H_8O_3 + 2O_2$). Glycerol was found to produce ribose, ribulose, rhamnose, ribulose duratives and deoxyribose.

Cyclodextrin, glycogen and oxygen were produced from warm carbonated water, silicic acid and the electrolysis of aluminum or copper wire with a 1.5-volt battery in carbonated water. (H_2CO_3 + 1.5-volts (e^-) + Al^{3+} ---> cyclodextrin + glycogen + $H_2O + O_2$).

From formaldehyde, formic acid, methanol, glycerol, ammonia, phosphoric acid and hydrogen peroxide, adequate amounts of monosaccharides, nucleosides, nucleotides, fatty acids, porphyrins, amino acids, non-carbohydrates, acetic acid derivatives, ribulose derivatives, sugar phosphates, acetic acid to just name a few compounds produced.

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