

More Evidence for an Aether of Protons and Electrons

Introduction

Part I of this article includes a letter I wrote to Linus Pauling and his response. My letter includes the results of some crude electrical discharge experiments performed in the mid 1980s. Part II attempts give mechanisms to explain the strange results obtained from these experiments.

Part I

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April 4, 1985

Professor Linus Pauling
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Dear Professor Pauling:

I greatly appreciate your taking the time to read and comment on my paper. Your comments are, of course, quite valid. I am not angry and will continue vitamin C. I have been aware of the extensive studies of the absorption and adsorption of gases by metals and constantly refer to the 1962 edition of "Scientific foundations of Vacuum Technique", by Dushman and Lafferty. I believe that this book is considered the best summary of such information. I have also read some original articles on the subject, especially those pertaining to the solution of hydrogen in silver at various temperatures. On page 427, Dushman makes the point that "activated adsorption has not been observed for the rare gases, for nitrogen on copper, or for hydrogen on gold and silver". The quantity of hydrogen Skinner reported obtaining from a tiny silver cathode could not have been in that cathode prior to his experiments.

My experiments have employed copper, mercury and aluminum electrodes because they are available. I had to cease using copper cathodes since, in the gas produced by the discharge, a dark green transparent coat forms on the inside of the Pyrex discharge tube in the vicinity of the cathode tip. On being heated the coating evolves a gas and becomes a clear golden yellow and then a highly conductive copper colored foil. If the discharge is continued after the dark green coat has formed, a copper foil is formed directly around about a four-inch length of the tube nearest to the cathode tip. A clear brown coating

forms on the glass around the next few inches of the cathode. The brown coating dissolves quickly in concentrated hydrochloric acid with the evolution of gas. On evaporation, a white solid is obtained. This is almost certainly cuprous chloride. I did not find reference to copper hydrides in recent articles on their structures, etc. The information most useful to me is in an 1899 textbook. A copy of part of the page is enclosed.

I have little doubt that the yellow coating I obtained is the material referred to as cuprous hydride and the brown coat is that referred to as cupric hydride.

Data on page 528 of Dushman indicates that the solubility of hydrogen in copper is much too low to explain my observations. On page 427, however he gives a curve showing that considerable hydrogen is chemisorbed on copper in hydrogen atmospheres, I doubt that the quantities of hydrogen required to explain my results could have been retained by copper through extended exposure to atmospheric pressure and some vacuum exposure, but I have more work to do before I can make a definite statement. Enclosed please find a small piece of the copper foil and a small piece of glass with the brown coating. I should point out that copper films are not expected to form under such conditions. According to Dushman (page 696, Table 10.1), at a pressure of 1 torr. Copper evaporation requires a temperature of 1622 °C. copper melts at 1084° C. The great portion of the copper film produced in my tube formed under a pressure of above 3 torr. of the gas produced by the discharge and a temperature in the range of 100° C.

The following experiment was performed using aluminum electrodes. On page 533, Dushman states that hydrogen is practically insoluble in solid aluminum, but is soluble to a small extent in the molten metal. He gives data on the solubility in the molten metal on the next page. On page 631 he gives a table which indicates that aluminum picks up no hydrogen when used as a getter. The apparatus I employed is pictured on the enclosed page. The discharge tube had been employed for several experiments over a period of two weeks and had not been opened to the air during that time. During this series of experiments wiring had been reversed several times, so both electrodes had been employed as cathode for considerable periods. It is well known that the properties of cathodes employed in low-pressure discharge change dramatically with use. The active ends of the electrodes had become quite rough and seemed to be covered with a dark gray non-metallic coating. I am enclosing the end of the anode which was employed in the following experiment. You may note that the portion of the electrode tip which touched or was close to the small diameter Pyrex tubing was practically unaffected by the discharge. The effects you see occurred when it was used as a cathode. The coating does not conduct electricity.

All of the experiments performed in this tube were carried out in a helium atmosphere. Considerable gas was produced in each experiment. This was removed between experiments. The ends of the discharge tube were sealed with neoprene stoppers. The discharges were carried out under low amperage conditions and the various glows in the tube never came within 20 centimeters of the stoppers. The cathode was grounded. It was felt many times through out the experiments. At no time did the portion outside the

tube become perceptibly warm. The glass tube was also felt through out the experiments. Only the portion within about four centimeters of the cathode tip became noticeably warm.

Between experiments the leakage-outgassing caused a pressure increase of about 2.5 microns per minute. This was probably due to leakage since the rate of pressure increase was practically independent of pressure between 10 and 4000 microns. Prior to the experiment discussed below the tube had not been used for 11 hours. The tube was evacuated to 27 microns and helium was added to a pressure of 2030 microns. As shown in the diagram, the less confined of the two electrodes was the cathode.

The experiment is preliminary in nature. Nothing is accurate. In order to show the effect of time between discharges on the voltage at which discharge starts, I had to increase the voltage, decrease the voltage and record the reading quite rapidly since the effect within the first minute after discharge seems very great. The time recorded is that at which I started to increase the voltage. The time to achieve discharge varied. Times between discharge listed in the table are therefore rough estimates.

This was the first of several similar experiments. All of the experiments lead me to the following conclusions:

1. There is much that I don't understand about discharge tubes.
2. The shorter the time since the discharge stopped, the lower the voltage at which discharge will start.
3. If the time between discharges is very short, discharge will start at very close to the voltage at which it stopped.
4. The effect is such that even one minute is very important.
5. The discharge can be started at a considerably lower voltage by tapping the tube in the vicinity of the cathode tip.
6. Heating the tube in the vicinity of the cathode has a similar but not as dramatic effect.
7. A coat builds up on the cathode tip during discharge. This appears to increase the voltage required to initiate the discharge.

Of course, these conclusions may not be valid for tubes with different electrodes or operated under different conditions.

Conclusions 2, 3 and 4 may indicate that something with a short half-life is formed during discharge and reduces the voltage required to produce a given current. Under each condition an equilibrium concentration of this something would eventually be achieved. When discharge is stopped, the concentration of this something would decrease with time. This may explain the need for the series resistor which is

employed to control the discharge. As the discharge starts, the discharge tube becomes more and more conductive. As this occurs the voltage drop across the resistor increases causing the voltage across the discharge to decrease. I have blown many fuses by using an insufficient series resistor.

Triatomic hydrogen may be the something referred to above. It was first discovered by J.J. Thomson in discharge tubes. Its existence was confirmed by Aston. Wendt and Landauer studied it extensively. They report that triatomic hydrogen, H_3 , is unstable and reverts to H_2 in about a minute. A copy of part of the summary of their paper is enclosed.

Conclusions 5 and 6 may corroborate my assumption that the reaction is initiated by the impact of a high-energy atom or molecule on the cathode surface. I can't help but think how I used to rap my radio which had a weak power tube to make it work.

I believe that the above results are consistent with the conclusions in my paper. However, Skinner's observation that hydrogen is initially produced at a rate consistent with Faraday's law of electrolysis is still the best evidence of an ether made up of protons and electrons.

I didn't intend to make this letter so long. I apologize. If you are at all interested, I would like permission to send you the results of my experiments every other month.

Very truly yours,

Paul E. Rowe

Enclosures: Copper foil
Glass with brown coating
Cathode tip
Data from experiment
Photograph of apparatus employed in described experiments

Table A
DATA FROM DISCHARGE EXPERIMENT USING ALUMINUM ELECTRODES

Code	Time Minutes	Interval Minutes	Volts at Start	Pressure microns	Volts	Milliamps
A	0	-----	1480	2030		
A	1	$\frac{3}{4}$	1240			
A	2	$\frac{3}{4}$	1190			
A	3	$\frac{3}{4}$	1130			
A	4	$\frac{3}{4}$	1110			

A	5	$\frac{3}{4}$	1110			
A	6	$\frac{3}{4}$	1110			
	7			2100		
A	9	$2\frac{3}{4}$	1150			
A	20	$10\frac{3}{4}$	1350			
A	21	$\frac{3}{4}$	1120			
A	22	$\frac{3}{4}$	1130			
A	23	$\frac{3}{4}$	1150			
A	24	$\frac{3}{4}$	1170			
A	25	$\frac{3}{4}$	1130			
	26			2200		
B	27	$1\frac{3}{4}$	1240		630	5.15
A	28 $\frac{1}{2}$	$\frac{1}{2}$	1130			
	29			2290		
A	31	$1\frac{3}{4}$	1220			
	32	Set at 1100v – no discharge. Started when bench on which apparatus was assembled was tapped.				
	33	Set at 1050v - no discharge in one minute.				
	34	Heated cathode area of tube with a propane torch. Discharge started in approximately one second.				
A	35	$\frac{1}{2}$	1040			
	36	Heated cathode area for one minute.				
A	37	$1\frac{1}{2}$	1250			
A	38	$\frac{3}{4}$	1340			
A	39	$\frac{3}{4}$	1260			
A	40	$\frac{3}{4}$	1180			
	55			2400		
	56	Heated cathode area for one minute				
A	57	$16\frac{3}{4}$	1200			
A	58	$\frac{3}{4}$	1340			
A	59	$\frac{3}{4}$	1320			
A	60	$\frac{3}{4}$	1240			
A	61	$\frac{3}{4}$	1160			
A	62	$\frac{3}{4}$	1160			
A	63	$\frac{3}{4}$	1140			
A	64	$\frac{3}{4}$	1160			
A	65	$\frac{3}{4}$	1170			
A	65 $\frac{1}{2}$	$\frac{1}{4}$	1080			
A	66	$\frac{1}{4}$	1080			
A	66 $\frac{1}{2}$	$\frac{1}{4}$	1060			
A	67	$\frac{1}{4}$	1070			
A	67 $\frac{1}{4}$	$\frac{1}{8}$	1010			
A	67 $\frac{1}{2}$	$\frac{1}{8}$	1160			
A	68	$\frac{1}{4}$	1130			
A	69	$\frac{3}{4}$	970			
	70	Repeatedly increased and decreased voltage as rapidly as I could. Discharge				

restarted as low as 620 volts.

A	72	?	1140		
A	73	$\frac{3}{4}$	1180		
A	74	$\frac{3}{4}$	1230		
A	75	$\frac{3}{4}$	1260		
A	76	$\frac{3}{4}$	1200		
	77			2500	
	78	$1 \frac{3}{4}$	1200	Let run. Set at 5 MA- Held at 5 MA	
	79			2560	634 5
	80			2610	626 5
	81			2660	622 5
	83			2680	612 5
	85			2700	----- ----
	87			2700	603 5
	88	Turned off and on quickly. Start at 607 volts. Turned variac down slowly. Off at 590 volts.			
A	89		1250		
A	90	$\frac{3}{4}$	1280		
A	91	$\frac{3}{4}$	1360		
A	92	$\frac{3}{4}$	1280		
A	93	$\frac{3}{4}$	1260		
A	94	$\frac{3}{4}$	1560		
A	95	$\frac{3}{4}$	1230		
A	96	$\frac{3}{4}$	1260		
	97	Set at 1000 volts. Tapped lightly near cathode tip. Started on first tap.			
	99	Set at 1000 volts. Tapped lightly near anode – no discharge. Tapped harder near cathode. Started on first tap.			
	100	Set at 1000 volts. Tapped lightly near cathode – no discharge. Tapped harder– didn't start.			
A	102	$1 \frac{3}{4}$	1380		
	103			2740	
	198			3000	
A	199	97	1590		
A	200	$\frac{3}{4}$	1290		
A	201	$\frac{3}{4}$	1240		
A	202	$\frac{3}{4}$	1300		
A	203	$\frac{3}{4}$	1250		
	204	Continuously turned on and off every $\frac{1}{4}$ minute. (1120v,1310v, 1350v, 1280v, 1380v, 1160v, 1340v, 1230v, 1220v, 1360v, 1200v, 1340v, 1320v)			
	207			3000	
	431			3480	

Code A indicates that the voltage was increased from 0 to discharge over a period of about ten seconds.

Code B indicates that the discharge was started similarly but stopped after about one minute.

(The diagram in the letter is described below:)

(A zero to 2000 volt DC power supply is connected to a discharge tube as follows: The negative terminal is connected through a 100 kilo-ohm resistor and a milliamp meter to the grounded aluminum cathode. The positive terminal is connected directly to the aluminum anode. A kilovolt meter is connected between the cathode and the anode.

The body of the discharge tube is a Pyrex tube that has an inside diameter of 2.3 cm. The cathode is a 3 mm. diameter aluminum rod. It passes through a neoprene stopper and is in the axial center of the tube. 37.4 cm. of the rod is in the discharge tube. The anode is a 1.5 mm. Aluminum rod. It is centered in a 0.6 cm. inside diameter Pyrex tube that passes through a neoprene stopper. The anode passes through a small neoprene stopper. The inside end the anode tube is rounded and has a central 0.3 cm. hole, aligned with the cathode. The anode wire tip is 0.9 cm. inside the end of its Pyrex tube. It is 73.3 cm. from the inside of its larger stopper. The tips of the anode and the cathode are 10.0 cm. apart. The volume of the discharge tube is approximately 520 ml.)

“Cuprous Hydride, CuH - This compound is made by treating a solution of barium hypophosphite with a solution of copper sulphate. It is thrown down as a yellow precipitate which gradually becomes darker. At 60° it decomposes into copper and hydrogen. With hydrochloric acid it yields cuprous chloride and hydrogen.

Cupric Hydride, CuH_2 . is formed by treating a solution of copper sulphate with hypophosphorous acid. When freshly prepared it is a reddish-brown sponge-like mass, which however changes to a chocolate-colored powder on being freed from acid and boiled for some time. It is not readily changed when heated in air. It dissolves in hydrochloric acid with the evolution of hydrogen.”

Copied from, “Inorganic Chemistry” by Ira Remsen 5th. ed. 1899

“Summary

1. A reactive modification of hydrogen has been produced by several methods, all dependent on gaseous ionization- by the alpha rays from radium emanation, by the electrical discharge under reduced pressure, and by the high potential corona at atmospheric pressure. Attempts to produce activation by Schumann light rays failed.
2. This active hydrogen reduces sulfur, arsenic, phosphorous, mercury, nitrogen, and both acid and neutral permanganate. It is condensed or destroyed by liquid air temperatures. It is unstable and reverts to the ordinary form in about a minute. It passes readily through glass wool. It is not less stable at atmospheric pressure than at low pressures.
3. The activity is not due to gaseous ions, and the properties of the active gas are quite different from those of Langmuir’s atomic hydrogen. The formation of a polyatomic molecule is indicated by the contraction of the hydrogen when ionized. Positive ray analysis at very low pressures shows a large proportion of triatomic molecules which are undoubtedly

the ones responsible for the chemical activity. All the properties of the gas point to its being an ozone form, perhaps properly called "hyzone.""
Gerald Wendt and Robert S. Landaur, JACS 42, pp. 930-46 (1920)

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19 April-1985

Mr. Paul E. Rowe
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Dear Mr. Rowe:

I have read your letter and examined the specimens you sent, and have thought about your observations.

I am returning the specimens herewith, because I cannot think of anything that I could do with them.

Also, I must say that my background of experience is such that I find it difficult to make any suggestions to you. You may well have observed some interesting phenomena, but I do not know enough to be able to discuss your results in a meaningful way.

Sincerely,

Linus Pauling

Part II

The following is an attempt to explain the results of the above experiments assuming that vacuum contains a concentrated matrix of protons and electrons:

1. As the discharge tube is evacuated, gases adsorbed on the electrode surfaces are removed.

2. As the voltage across the electrodes is increased, aether electrons are drawn closer to the anode surface and aether protons are drawn closer to the cathode surface.
3. At some voltage, the most energetic collisions of gas atoms or molecules on the cathode supply sufficient energy to permit a cathode electron to combine with an adjacent aether proton to form a monatomic hydrogen atom, which is, then, released into the gas. This leaves an extra electron in the vicinity of the cathode. This electron is repelled from the cathode area and attracted toward the anode. This may initiate a falling domino like effect that result in a neighboring aether electron being taken up by the anode.
 At this point, the rate of hydrogen production follows Faraday's law of electrolysis. (Note that this explains the ejection of electrons from the cathode at much lower voltages than occurs in much better vacuums.) Monatomic hydrogen is extremely reactive. It combines with the cathode surface to form a hydride, with another hydrogen atom to form diatomic hydrogen, with diatomic hydrogen to form triatomic hydrogen and possibly with the gas atoms or molecules originally in the tube.
4. Triatomic hydrogen atoms diffuse through the tube. When they arrive at the anode, they deposit electrons and become triatomic hydrogen ions. These ions accelerate toward the cathode and pick up electrons to form triatomic hydrogen atoms.
5. The data in Part I of this paper suggests the triatomic hydrogen electron transfer is much more efficient than any other conduction mechanisms in the discharge tube. As the triatomic hydrogen concentration increases, the voltage across the discharge tube must be reduced or a fuse will blow (or worse).
6. At some voltage, much lower than that at discharge initiation, all glows disappear and the rate of triatomic hydrogen formation is the same as the rate of its dissociation. At that voltage just enough hydrogen is produced to keep the triatomic hydrogen concentration constant. Very little of the current is due to electron transfer through the tube.
7. If the voltage is reduced the amperage drops and a new equilibrium concentration of triatomic hydrogen is achieved. At some voltage the discharge stops and no more triatomic hydrogen is produced and the triatomic hydrogen concentration quickly decreases.
8. The voltage at which the discharge will restart depends on how long it was stopped.

The following are conclusions from Table A:

1. Between 207 minutes and 431 minutes the pressure increases by 480 microns. This indicates a leakage-outgassing rate of $480/224 = 2.14$ microns per minute. Some of this may be outgassing from the neoprene stoppers.

2. Between 79 minutes and 87 minutes, while the current was held at 5 milliamps, the voltage dropped from 634v to 603v and the pressure increased by 140microns. The rate of pressure increase between 79 and 81 minutes was $(2660-2560)/2 = 50$ microns per minute. This is almost 20 times the outgassing rate. At 87 minutes, the pressure leveled off . I suspect this indicates the triatomic hydrogen concentration had approached the level required to stabilize at 5 milliamps under these conditions.
3. At 32 minutes and at 97 minutes, the discharge did not start until the tube was tapped or shaken. This may have increased the velocity of some of the gas particles striking the cathode surface that started the discharge.
4. At 34 minutes the discharge started when he tube was heated in the vicinity of the cathode. This probably occurred for the same reason.

Sepp has been kind enough to put some of my articles and my strange play on his blog. All, but one, are arguments for the presence of a concentrated matrix of protons and electrons throughout the knowable universe. "A History of Dark Matter?" suggests the proposed matrix may be the dark matter for which scientists are searching. The article includes several references. To me, the most compelling is a paper by Clarence Skinner in the 1905 Physical Reviews.

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