ISSN 2229-5518

Effect of variation in the concentration of ammonium molybdate in the parental environmental medium (PEM), on the pH and the photochemical reduction of Mo^{6+} to Mo^{4+} in the PEM of the Silicon Molybdenum Jeewanu 1.531211 SMJ8 both before and after exposure.

Deepa Srivastava

ABSTRACT: In the present scenario of several alternative sources of energy, the study of Jeewanu can prove to be an asset. Jeewanu, the autopoeitic eukaryote, and its functional properties have revealed a process of utilization of solar energy and also its conversion to chemical bonds which perhaps nature did a few billion years back to initiate the formation of life on earth. These microstructures have ferredoxin like material in them. They also show nitrogenase like activity. Thus these microstructures can be used to split water and use the hydrogen formed as a source of energy in future.

KEY WORDS: Ammonium Molybdate, Autopoeitic, Eukaryote, Jeewanu, Parental Environmental Medium, pH, Photochemical Reduction, SMJ8

INTRODUCTION:

Depleting conventional energy sources like coal, oil, gas etc. and escalating costs coupled with increasing pollution and carbon emission increasing green house effect have necessitated fresh alternatives. In the present scenario of several alternative sources of energy, the study of Jeewanu can prove to be an asset. Jeewanu, the autopoeitic eukaryote, and its functional properties have revealed a process of utilization of solar energy and also its conversion to chemical bonds which perhaps nature did a few billion years back to initiate the formation of life on earth. (1) In Algae the chloroplast-ferredoxin-hydrogenase system helps in splitting water. These microstructures have ferredoxin like material in them. (2) They also show nitrogenase like activity. (3) Thus these microstructures can be used to split water and use the hydrogen formed as a source of energy in future.

The Silicon Molybdenum microstructures are prepared by exposing a mixture of ammonium molybdate, diammonium hydrogen phosphate, mineral solution and formaldehyde.

The aqueous mixture of these microstructures acquire energy during exposure producing Mo4+ from Mo6+ and it might be that Mo4+ is utilized in the formation and growth of these microstructures meanwhile getting converted to Mo6+.

Molybdenum is closely related to the life and living forms since the life originated on earth. The presence of proportional concentrations of molybdenum to the concentrations of organic matters in the sediments is observed. Due to its various catalytic functions, molybdenum has great biochemical importance also. So it was used in the preparation of molybdenum Jeewanu. (4) The ammonium salts of molybdenum were used to provide a source of fixed nitrogen.

The aqueous mixture of these microstructures acquire energy during exposure producing Mo4+ from Mo6+ and it might be that Mo4+ is utilized in the formation and growth of these microstructures meanwhile getting converted to Mo6+.

These microstructures are capable of releasing protons in the aqueous medium around in sunlight as indicated by decrease in the pH on exposure. These protons are used subsequently and increase in pH is observed in shade. As the consumption of proton as shown in the shade is not a photochemical reaction it catalytically takes place in both light and shade.

EXPERIMENTAL:

The following solutions were prepared:

a) 4% (w/v) ammonium molybdate
b) 3% (w/v) diammonium hydrogen phosphate
c) *Mineral solution:* It was prepared by taking different mineral solutions and mixing them in definite proportion.
d) 36% formaldehyde was used in this experiment.
e) 3% (w/v) sodium chloride
f) 5% (w/v) water soluble sodium silicate

All the solutions except formaldehyde were sterilized in an autoclave at about 15 lbs for about 30 minutes.

Four clean, dry and sterilized corning conical flasks of 250 ml capacity were taken and labeled 1 to 4. In each flask 30 ml diammonium hydrogen phosphate was added, 10 ml of mineral solution 20 ml formaldehyde, 10 ml sodium chloride and 10 ml sodium silicate were added. In flask 1 to 4, 0 ml, 5 ml, 10ml, 15 ml of ammonium molybdate was added respectively. After this, 15 ml, 10 ml, 5 ml, 0 ml of double distilled water was added to flask 1 to 4 respectively. Thus the total volume of each flask was 95 ml. Thus the total volume of flask 1 to 4 was 95 ml each and flask 5 has a total volume of 105 ml. The percentage by weight of ammonium molybdate in flask 1 to 4 was 0, 0.21, 0.42 and 0.63 respectively.

Each flask was shaken well after adding each constituent, cotton plugged and exposed to sunlight for total 8 hours giving 2 hours exposure daily for four days. The colorimetric reading and the pH readings were recorded after 0, 10, 20, 30, 40, 50, 60, 70, 80, 90,100,110, 120, 240, 360 and 480 minutes respectively. The microscopic observation were also made at the above mentioned exposure time. After 8 hours of exposure, the particles of each flask were filtered, dried in a desiccator and weighed. The yield of the particles of each flask was noted respectively.

Klett-Summerson double cell photo electric colorimeter was used for the comparative study of the intensity of the blue colour of the different mixtures.

Digital pH meter was used to measure the pH of the various mixtures during the experiment performed

OBSERVATIONS:

TABLE –1

Effect of different concentrations of Ammonium molybdate in the PEM on the colour intensity of the PEM with increasing period of exposure

Period of exposure in minutes	Colorimetric readings			
	Percentage of ammonium molybdate in the PEM			
	0	0.21	0.42	0.63
0	3	5	6	7
10	7	62	66	95
20	22	167	280	365
30	2	209	500	386
40	12	290	760	420
50	15	315	800	580
60	11	250	455	640
70	6	112	240	345
80	4	142	410	440
90	3	211	520	520
100	3	255	534	644
110	2	325	538	680
120	2	385	545	695
240	1	425	610	712
360	1	450	622	728
480	1	463	655	740

TABLE – 2

Effect of different concentrations of ammonium molybdate in the PEM on the pH of the PEM with increasing period of exposure.

Period of exposure in minutes	pH of the PEM			
	Percentage of ammonium molybdate in the PEM			
	0	0.21	0.42	0.63
0	3.45	3.37	3.34	3.29
10	3.15	2.97	2.90	2.80
20	2.96	2.87	2.81	2.74
30	2.94	2.88	2.82	2.73
40	3.03	2.93	2.84	2.79
50	2.96	2.91	2.84	2.79
60	2.96	2.86	2.83	2.78
70	2.95	2.87	2.82	2.77

80	2.94	2.87	2.82	2.77
90	2.94	2.89	2.84	2.79
100	2.95	2.89	2.85	2.79
110	2.95	2.88	2.84	2.79
120	2.92	2.87	2.83	2.78
240	2.87	2.81	2.78	2.71
360	2.92	2.86	2.83	2.78
480	2.86	2.77	2.83	2.68

Yield of the particles of the four mixtures were as follows:

S.N.	Percentage by weight of ammonium molybdate in the PEM	Yield of SMJ8 in g
1	0.00	0.0642
2	0.21	0.0830
3	0.42	0.1810
4	0.63	0.2696

TABLE – 3

Effect of different concentrations of ammonium molybdate on the number of the particles, (SA/view)

Period of exposure in minutes	Percentage of ammonium molybdate in the PEM			
	0	0.21	0.42	0.63
0	-	-	-	-
10	-	-	-	-
20	-	-	14.6 ± 1.66	-
30	-	-	12.2 ± 0.84	12.4 ± 0.80
40	-	4.6 ± 0.50	12.0 ± 0.70	11.2 ± 014
50	-	5.0 ± 0.70	10.2 ± 0.80	11.6 ± 1.20
60	-	3.6 ± 0.50	11.6 ± 1.20	30.0 ± 0.70
70	-	12.2 ± 0.86	55.4 ± 1.90	32.2 ± 0.86
80	-	10.4 ± 0.52	32.2 ± 0.86	36.0 ± 1.70
90	-	207.0 ± 2.10	35.2 ± 1.80	55.2 ± 1.71
100	-	105.0 ± 1.84	17.2 ± 0.86	22.8 ± 0.86
110	-	7.2 ± 0.86	12.2 ± 0.86	17.2 ± 0.86
120	-	27.2 ± 0.94	4.2 ± 0.58	7.2 ± 0.86
240	-	103.4± 1.72	55.2 ± 1.72	27.6 ± 0.92
360	-	46.6 ± 1.11	23.6 ± 1.36	154.6 ± 1.88
480	-	35.0 ± 1.70	54.6 ± 1.88	65.2 ± 1.85

TABLE – 4

Effect of different concentrations of ammonium molybdate on the size of the particles, (SA/view)

Period of exposure in minutes	Percentage of ammonium molybdate in the PEM			
	0	0.21	0.42	0.63
0	-	-	-	-
10	-	-	-	-
20	-	-	0.25 ± 0.003	-
30	-	-	0.25 ± 0.001	0.12 ± 0.006
40	-	0.5 ± 0.003	1.00 ± 0.006	-
50	-	0.5 ± 0.006	0.50± 0.008	1.00 ± 0.008
60	-	0.5 ± 0.001	1.00 ± 0.006	1.00 ± 0.001

70	-	0.5 ± 0.002	1.00± 0.001	1.00 ± 0.006
80	-	0. 5± 0.001	1.00 ± 0.005	1.00 ± 0.005
90	-	1.0 ± 0.005	1.00 ± 0.002	1.25 ± 0.003
100	-	1.0 ± 0.006	1.00 ± 0.008	1.25 ± 0.006
110	-	1.0 ± 0.003	1.00 ± 0.001	1.25 ± 0.001
120	-	1.0 ± 0.004	1.00 ± 0.009	1.25 ± 0.008
240	-	1.0 ± 0.001	1.25 ± 0.001	1.25 ± 0.001
360	-	1.0 ± 0.003	1.25 ± 0.001	2.00 ± 0.005
480	-	1.0 ± 0.004	1.50 ± 0.004	2.00 ± 0.004

DISCUSSION

The observations indicate that there is an initial rise in the blue colour intensity of the PEM up to 50 minutes, in PEM having 0.21% and 0.42% and up to 60 minutes in the PEM having 0.63% ammonium molybdate. Then there is a sudden decrease in the intensity of the blue colour up to 70 minutes. After this a sudden rise of absorbance is observed in all the three mixtures having ammonium molybdate. But the PEM having no ammonium molybdate showed no formation of blue colour. It remained almost colourless throughout the exposure period of 480 minutes whereas when ammonium molybdate was added to the PEM. It was observed that as the concentration of ammonium molybdate increased in the PEM, the intensity of the blue colour increased, showing the increased in the reduction of Mo6+ to Mo4+ during exposure period of 8 hours. After 50 minutes of exposure, highest peak of absorbance was shown by the PEM having 0.42% ammonium molybdate but after total exposure of 8 hours, the maximum blue colour intensity was shown by the PEM having 0.63% ammonium molybdate.

The observation of pH versus exposure time noted for different exposure time, show that as the concentration of ammonium molybdate is increased in the PEM, the initial pH of the PEM decreases. The decreasing trend continues up to 30 minutes after which a slight rise in the pH was observed in each of the four cases, then again the pH decreases and remains almost constant up to two hours of exposure. After this, a fall in pH is observed after 4 hours of exposure. The pH then rises up to 8 hours. After 8 hours of exposure, the pH decreases in all the four cases. However, after 8 hours of exposure, it is observed that the decrease in pH increases with increase in the concentration of ammonium molybdate in the PEM. With increase in the concentration of ammonium molybdate, the yield was observed to increase showing that more Jeewanu are formed in the PEM with higher concentration of ammonium molybdate.

REFERENCES:

1) Bahadur K. and Ranganayaki S. (1980) (origin of life, a functional approach, M/S Ram Narain Lal and Beni Prasad, Allahabad, India.

2) Rao K.K., Morris P. and Hall D.O. (1978), presented at the workshop meeting on Hydrogenase, their catalytic activity, structures and functions, held at Gottingen.

3) Bahadur K. , Ranganayaki S. , Smith A. and Folsome C. (1980), Natl. Acad. Sci., India, Golden Jubilee Commemoration, Vol. 181-198.

4) Smith A.E., Folsome C. and Bahadur K., (1981), Experientia, 37, 357.

Dr. Deepa Srivastava
E- Mail – srivastava.deepa@ymail.com
Lecturer,
Department of Chemistry,
S.S.Khanna Girls' Degree College,
Constituent College of Allahabad University,
Allahabad,
Uttar Pradesh,
India
Postal Address – 276/89/FF01,
Maa Lalita Apartment,

Muir Road,
T.V.Tower Crossing,
Allahabad – 211001,
Uttar Pradesh,
India