

Effect of Addition of Methanol and Ammonium Molybdate to (0 + 15):30:10:20:10:10 SMJ8 Jeewanu on the pH of the PEM of the Jeewanu both before and after Exposure to Sunlight up to a Total of 32 Hours.

Deepa Srivastava¹

Assistant Professor, Department of Chemistry, S.S.Khanna Girls' Degree College, Constituent College of Allahabad University, Allahabad, Uttar Pradesh, India

ABSTRACT: Self-sustaining Jeewanu are formed in the sterilized aqueous mixture of ammonium molybdate, diammonium hydrogen phosphate, mineral solution and formaldehyde on exposure to sunlight. The aqueous mixture of SMJ8 are capable of reducing the pH on exposure to sunlight indicating the formation of protons and in shade the mixture shows increase in pH i.e. decrease in proton. This is also followed by the reduction of Mo^{6+} to Mo^{4+} in sunlight and oxidation of Mo^{4+} to Mo^{6+} in shade. The associated energy liberation is interesting because it could be utilized by the particles concerned for many reactions of metabolism in these particles. The work is aimed to investigate as to what happens to the pH of the mixture during the exposure and when the mixture stands in shade in the partial darkness during the day when it is kept in the laboratory after exposure and then stands for the whole night in darkness before the next exposure of 1 hour of sunlight was given.

KEYWORDS: Autopoietic, Eukaryote, Jeewanu, SMJ8, pH, Methanol, PEM, Ammonium Molybdate, Sunlight, Exposure

I. INTRODUCTION

According to some molecular biologists, the theory of molecular automata most successfully describes the growth, reproduction and control of biological organization. (Ingram, 1965, Changeux, 1965). [1] Self-sustaining autopoietic eukaryote Jeewanu is formed in the sterilized aqueous mixture of ammonium molybdate, diammonium hydrogen phosphate, mineral solution and formaldehyde on exposure to sunlight. As nucleic acid bases, sugars, amino acids, peptides and phospho lipids are formed in these particles, this may be another example of such molecular automata. (Bahadur and Ranganayaki, 1970). [2] A number of peptides have been detected in the photochemically formed Jeewanu. (Briggs, 1965). [3] Ganti emphasized the combination of a metabolic cycle and membrane as a self-reproducing microstructure. [4]

The aqueous mixture of SMJ8 are capable of reducing the pH on exposure to sunlight indicating the formation of protons and in shade the mixture shows increase in pH i.e. decrease in proton. This is also followed by the reduction of Mo^{6+} to Mo^{4+} in sunlight and oxidation of Mo^{4+} to Mo^{6+} in shade. The associated energy liberation is interesting because it could be utilized by the particles concerned for many reactions of metabolism in these particles.

The effect of pH on various functional properties such as photochemical splitting of water, fixation of nitrogen and CO_2 reduction has been investigated by a number of scientists. (Mehta, R. and Kesarwani, G, G) [5, 6] The effect of pH on the fixation of inorganic carbon and molecular nitrogen by 1211J24 Jeewanu was studied by Kumar in 1981

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(Kumar, S, 1981) [7] and by thiocyanate Jeewanu by Verma (Verma, P, 1982). [8] The effect of pH on the photochemical splitting of water by HMJ60 having Iron and Manganese in their PEM was studied by Kumar (Kumar, R, 1982). [9] It was decided to find out the effect of different ingredients of the PEM on the pH of the PEM both before and after exposure during the formation of Jeewanu.

Effect of variation in the concentration of mineral solution, formaldehyde and ammonium molybdate on pH and colour intensity of the PEM of 1.531211 SMJ38 Jeewanu before and after exposure to sunlight was studied by Srivastava, D. [10, 11, and 12]

An attempt has been made to investigate the effect of addition of methanol and ammonium molybdate in the PEM of the (0 + 15):30:10:20:10:10SMJ8 Jeewanu on the pH of the PEM both before and after exposure was recorded up to a total of 32 hours and was investigated. The period of exposure to sunlight was changed to 1 hour per day from typical exposure of 4 hours per day for the formation of Jeewanu to investigate as to what happens to the pH of the mixture during the exposure and when the mixture stands in shade in the partial darkness during the day when it is kept in the laboratory after exposure and then stands for the whole night in darkness before the next exposure of 1 hour of sunlight was given.

II. RELATED WORK

Self-sustaining autopoietic eukaryote Jeewanu was prepared in the sterilized aqueous mixture of ammonium molybdate, diammonium hydrogen phosphate, mineral solution and formaldehyde by exposing it to sunlight by Bahadur and Ranganayaki in 1970.

When the aqueous mixture of SMJ8 Jeewanu was exposed to sunlight, a decrease in the pH was observed and when the aqueous mixture was kept in shade, the pH increased. Simultaneously reduction of Mo_6^+ to Mo_4^+ in sunlight and oxidation of Mo_4^+ to Mo_6^+ in shade was also observed. The associated energy was utilized by the particles concerned for many reactions of metabolism in these particles.

A number of scientists have studied the effect of pH on various functional properties such as photochemical splitting of water, fixation of nitrogen and CO_2 reduction.

Effect of variation in the concentration of various ingredients in the PEM like mineral solution, formaldehyde and ammonium molybdate on pH and colour intensity of the PEM of 1.531211 SMJ38 Jeewanu before and after exposure to sunlight was studied.

This work was carried out to study the effect of adding both methanol and ammonium molybdate to the PEM of 1.531211 SMJ38 Jeewanu before and after exposure to sunlight.

III. EXPERIMENTAL RESULTS

The following solutions were prepared:

- 4% (w/v) ammonium molybdate
- 3% (w/v) diammonium hydrogen phosphate
- Mineral solution: It was prepared by mixing various minerals in appropriate proportions.
- 36% formaldehyde
- 3% (w/v) sodium chloride
- 5% (w/v) water soluble sodium silicate

Preparation of the PEM of Jeewanu:

One dry, clean and sterilized conical flask of 150 ml capacity was taken. 15 ml distilled water, 30 ml diammonium hydrogen phosphate; 10 ml mineral solution and 10 ml sodium silicate were added in the flask. The total volume of the mixture was 95 ml.

The flask was cotton plugged, shaken well and exposed to sunlight for 8 hours giving 2 hours exposure daily for four days. The pH of the mixture was noted after each exposure. Then after 8 hours exposure, 30 ml of methanol was added and again the pH was recorded immediately. Then after this, 15 ml of ammonium molybdate added and again the pH was recorded. After this, the mixture was exposed to sunlight for total of 32 hours giving 1 hour exposure daily for 24 days and the pH was recorded both before and after each exposure.

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Observations

The observations made on the change in pH of the PEM of (0 + 15):30:10:20:10:10SMJ8 Jeewanu where first figure in the bracket represents amount of ammonium molybdate and second figure represents the amount of distilled water in ml, have been tabulated below:

TABLE – 1

Effect of exposure on the pH of the PEM of (0 + 15): 30:10:20:10:10SMJ8.

Period of exposure in minutes	pH of the PEM of (0 + 15): 30:10:20:10:10SMJ8.
0	3.45
10	3.15
20	2.96
30	2.95
40	3.03
50	2.96
60	2.95
70	2.94
80	2.94
90	2.95
10	2.95
110	2.92
120	2.92
240	2.87
360	2.92
480	2.86

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- a) pH after the addition of 30 ml of methanol was 2.73
- b) pH after the addition of 15 ml of ammonium molybdate was 4.20

The total volume of the mixture after this addition became 140 ml. The ration of the various solutions is 15:30:10:20:10:10:30:15 i.e. 15 ml distilled water, 30 ml diammonium molybdate, 10 ml mineral solution, 20 ml formaldehyde, 10 ml sodium chloride, 10 ml sodium silicate, 30 ml methanol and 15 ml ammonium molybdate.

TABLE – 2

Effect of addition of methanol and ammonium molybdate on the pH of the PEM before and after exposure.

Period of exposure in minutes	pH of the PEM	
	Before exposure	After exposure
9	4.20	3.71
10	3.78	3.75
11	3.85	3.82
12	3.54	3.38
13	3.51	3.36
14	3.48	3.35
15	3.52	3.52
16	3.46	3.35
17	3.48	3.29
18	3.42	3.41
19	3.40	3.28
20	3.42	3.28
21	3.35	3.23
22	3.39	3.28
23	3.41	3.25
24	3.41	3.24
25	3.34	3.32
26	3.03	2.99
27	3.07	3.00
28	3.07	2.96
29	3.11	2.95
30	3.09	2.98
31	3.11	2.97
32	3.09	3.02

IV. CONCLUSION

It was observed that when no ammonium molybdate was added to the PEM of silicon molybdenum Jeewanu, there was a sudden decrease in the pH of the PEM on exposure to sunlight up to 30 minutes, and then it increased up to 40 minutes. However, there was not much decrease in the pH between 50 minutes to 110 minutes of exposure. Then again the pH of the PEM decreased gradually up to 8 hour of exposure. The PEM remained colourless as no ammonium molybdate was added because the Mo^{4+} , which is formed by the photochemical reduction of Mo^{6+} in the PEM having ammonium molybdate, was not present and hence no blue colour was observed in the PEM on even 8 hours of exposure.

When 30 ml of methanol was added to the PEM after 8 hours of exposure, a further decrease in the pH was observed. But the PEM did not turn blue and remained colourless.

After this, 15 ml of ammonium molybdate was added to the same PEM in which methanol was added. It was observed that as soon as the ammonium molybdate was added to the PEM, the pH of the PEM increased suddenly to the

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considerable extent. Then the PEM was exposed to sunlight, the colourless PEM turned blue due to the reduction of Mo^{6+} to Mo^{4+} in the PEM. It was further observed that the pH of the PEM decreased on exposure to sunlight. However, a sudden decrease in the pH was observed after 11 hours, 15 hours, 18 hours and 25 hours of exposure. Another interesting feature observed was that before exposure almost every day, the pH was more, and after exposure it decreased. The decreasing tendency of the pH was also observed in the pH before exposure from 9 hours up to 32 hours of exposure.

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