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Morphological features of the 1.531211 BMJ24 Jeewanu (both PUOC and PUAC) as effected by the different concentration of zinc sulphate in the PEM

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Abstract
The present form of cell as we see it today has undergone evolution of 3.2 billions of years.
According to Bahadur and Ranganayaki the earliest living cells was very simple in structure and were full of the properties of biological order.
Bahadur in 1967 suggested that the way in which the systems organize themselves with properties of biological order is very important feature of the study of origin of life. Jeewanu, the autopoetic eukaryotes were prepared by Bahadur in 1967.
It was observed that when a mixture of Jeewanu and water is exposed to sunlight, water is split up into H_2 and O_2.But due to the nitrogenase like activity of Jeewanu, the produced hydrogen is utilized in the fixation of nitrogen.
The hydrogen produced by the splitting of water is also utilized in the reduction of inorganic carbon.
Khare prepared boron molybdenum Jeewanu in 1989 which showed significant water splitting.
The presence of certain transitional metal ions e.g. Mn, Co, Zn, Cu and Fe individually in the parental environmental medium of molybdenum Jeewanu activated the water splitting ability of molybdenum Jeewanu.
An attempt has been made in this paper to study the effect of addition varying concentrations of $ZnSO_4$ to the PEM on the morphological properties of BMJ24 Jeewanu prepared both under oxygenic (PUOC) and anoxygenic conditions (PUAC).

Keywords: Jeewanu, BMJ24, PEM, $ZnSO_4$, autopoetic, eukaryotes, exposure, Mineral solution, sunlight, PUOC, PUAC, morphology, pyrogallol

Introduction

The present form of cell as we see it today has undergone evolution of 3.2 billions of years. According to Bahadur and Ranganayaki the earliest living cells was very simple in structure and were full of the properties of biological order. (Bahadur, K and Ranganayaki, S, 1964) [1]. To tackle the problem of origin of life, it is essential to know how this earliest cells were synthesized under natural conditions. The molecular or the Chemical Evolution Theory given by Haldane (1929) [2] and Oparin (1924) [3] is the basis of the modern approach to the problem of 'Origin of life'. Bahadur in 1967 suggested that the way in which the systems organize themselves with properties of biological order is very important feature of the study of origin of life. (Bahadur, 1967) [4]. The problem of origin of life in investigated basically in order to find out the natural condition under which the replicating, self-sustaining systems were produced. (Blum, 1961, Bahadur and Ranganayaki, 1966) [5, 6].

The origin of life can be approached the best way if life and the living systems are considered in the light of functional properties. (Bahadur and Ranganayaki, 1980) [7].

It was observed that when a mixture of Jeewanu and water is exposed to sunlight, water is split up into H_2 and O_2.But due to the nitrogenase like activity of Jeewanu, the produced hydrogen is utilized in the fixation of nitrogen. Kumar in 1982 estimated the fixed nitrogen of the exposed mixture and thus confirmed the fixation of nitrogen by Jeewanu chemically.
(Kumar, 1982) [8]. The hydrogen produced by the splitting of water is also utilized in the reduction of inorganic carbon. (Smith *et al.* 1981) [9]. They observed that on exposure to light from a mercury lamp, the aqueous mixture of Jeewanu, $NaHCO_3$ and water shows the appearance of ^{14}C in the organic material.

It was observed that the presence of certain transitional metal ions e.g. Mn, Co, Zn, Cu and Fe individually in the parental environmental medium of molybdenum Jeewanu activated the water splitting ability of molybdenum Jeewanu. (Bhattacharya, 1982) [10].

Khare, Y, (1989) studied the effect of addition of zinc to the PEM of 1. ½: 3: 1: 2: 1:1: ¼ BMJ24 Boron Molybdenum Jeewanu and reported that that the PEM having 10 mg of zinc sulphate per 107.5 ml of PEM showed maximum number as well as maximum size of the particles formed. He further observed that the particles produced are less efficient in the splitting of water but more efficient in the fixation of nitrogen. (Khare, Y, 1989) [11].

Bahadur and Ranganayaki (1970) have observed that the organo- molybdenum microstructures are able to split water into hydrogen and oxygen in presence of sunlight and fix molecular nitrogen [12].

It was observed that addition of sodium chloride in the PEM of BMJ24 Jeewanu, produced particles of larger size and the hydrogen ion formation increased with period of exposure.

(Srivastava, D., 1991) [13].
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. [14] - [18]
Effect of irradiation of 1.5312211SMJ29 Silicon Molybdenum Jeewanu PEM with clinical mercury lamp and sunlight on the morphology of the silicon molybdenum Jeewanu was studied by Srivastava [19].
Effect of addition of Methanol and Ammonium Molybdate to (0+15):30:10:20:10:10 SMJ8 Jeewanu on the morphology, pH and colour intensity of the PEM of the Jeewanu both before and after Exposure to Sunlight up to a Total of 32 Hours was studied by Srivastava, D [20, 21].
Variation in the blue colour intensity and the pH of the PEM of 1.531211SMJ29 silicon molybdenum Jeewanu when the PEM is irradiated with clinical mercury lamp and sunlight" was studied by Srivastava, D [22].
Srivastava, D., "Study of the effect of addition of Sodium Chloride on the pH and blue colour intensity of the PEM of the BMJ24 Jeewanu" was studied by Srivastava, D [23].
Study of the effect of NaCl addition on the functional properties of BMJ24 (PUOC) in water and in phosphate buffer of pH 6, 7 and 8 under oxygenic conditions was studied by Srivastava, D [24].
Study of the effect of NaCl addition to the PEM on the functional properties of BMJ24 Jeewanu prepared under oxygenic conditions (PUOC) in water and in phosphate buffer of pH 6, 7 and 8 under anoxygenic conditions was studied by Srivastava, D [25].
Study of the effect of NaCl addition to the PEM on the functional properties of BMJ24 Jeewanu prepared under anoxygenic conditions (PUAC) in water and in phosphate buffer of pH 6, 7 and 8 under anoxygenic conditions was studied by Srivastava, D[26].
This paper deals with the study of the effect of addition of different concentrations of $ZnSO_4$ on the morphological properties of BMJ24 Jeewanu prepared under oxygenic conditions (PUOC) and anoxygenic conditions (PUAC).

Experimental
Procedure
The following solutions were prepared:
1. 4% (w/v) ammonium molybdate
2. 3% (w/v) diammonium hydrogen phosphate
3. **Mineral solution:** It was prepared by mixing appropriate proportions of different minerals.
4. 36% formaldehyde
5. 3% (w/v) sodium chloride solution,
6. 5% (w/v) sodium borate solution
7. In order to study the effect of zinc on the properties of the BMJ24 Jeewanu a solution of 100 mg of zinc sulphate in 100 ml of distilled water was prepared in addition to the other usual solutions.

Each solution, except formaldehyde, was sterilized in an autoclave at 15 lbs for 15 minutes.

Preparation of alkaline pyrogallol
0.15 ml of 30% aqueous solution of sodium hydroxide and 0.15 ml of 20% aqueous solution of pyrogallol were mixed and thus the alkaline pyrogallol was prepared.
Eight clean, sterilized, dry corning conical flasks of 250 ml capacity were taken and marked from 1 to 8. In each of them, 30 ml of ammonium molybdate solution, 60 ml of diammonium hydrogen phosphate solution, 20 ml of mineral solution, 40 ml of 36% formaldehyde solution, 20 ml of sodium chloride solution and 20 ml of sodium borate were taken. Then the zinc sulphate was added to each flask as follows:

Table 1

Flask number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Volume of $ZnSO_4$	0	5	10	20	0	5	10	20

Then in each of the flask labeled 5,6,7 and 8 a test tube half filled with alkaline pyrogallol was kept in such a manner that it stands erect and the solution within the test tube and outside the test tube do not get mixed up. The total volumes of flask number 1, 2, 3, 4, 5, 6, 7 and 8 were 190 ml, 195 ml, 200 ml, 210 ml, 190 ml, 195 ml, 200 ml and 210 ml respectively. The percentage by weight of $ZnSO_4$ in flasks 1 to 8 were 0%, 0.26%, 0.5%, 0.95%, 0%, 0.26%, 0.5%, 0.95% respectively. Then flask numbers 1 to 4 were cotton plugged and flask number 5 to 8 were plugged tightly with rubber cork. Each flask was shaken gently by whirling motion and exposed to sunlight for a total of 24 hours giving four hours exposure daily.
After4hours, 8 hours, 12 hours, 16 hours, 20 hours and 24 hours of exposure, the microscopic observations were done simultaneously. But for flask number 5 to 8, observations were made only after24 hours of exposure to maintain the anoxygenic condition within the flasks.

Observations

Table 2: Effect of different concentrations of $ZnSO_4$ in the PEM of 1.531211 BMJ24 Jeewanu on the yield of the solid material formed in g.

Condition	**Yield of the solid material formed in the PEM in g**			
	Percentage of $ZnSO_4$ added to the PEM			
	0	0.20	0.50	0.95
Oxygenic	1.0386	0.3880	0.2846	1.0528
anoxygenic	1.0752	0.9354	0.9070	1.1910

Table 3: Effect of addition of different concentrations of $ZnSO_4$ to the PEM of 1.531211 BMJ24 Jeewanu on the number of the particles (SA/View) with increasing period of exposure.

Period of exposure in hours	**Oxygenic set**			
	Percentage of $ZnSO_4$ added to the PEM			
	0.00	0.26	0.50	0.95
4	50.4± 0.66	21.6± 0.46	31.4± 0.97	61.4± 0.67
8	71.0± 0.63	30.4± 0.24	44.0± 1.37	84.0± 1.09
12	111.0± 0.80	20.6± 0.40	35.2± 2.13	71.0± 0.54
16	131.0± 0.54	51.6± 0.60	61.4± 1.12	96.8± 1.77
20	143.0± 0.73	99.4± 0.40	51.6± 0.87	306.8± 1.77
24	152.6± 1.02	121.2± 0.96	32.8± 1.01	159.4± 0.40
Period of exposure in hours	Anoxygenic Set			
	Percentage of $ZnSO_4$ in the PEM			
	0.00	0.26	0.50	0.95
24	108.6± 0.60	82.4± 1.12	5.2± 0.80	1.6±2.44

Table 4: Effect of addition of different concentrations of $ZnSO_4$ to the PEM of 1.531211 BMJ24 Jeewanu on the size of the particles in µ (SA/View) with increasing period of exposure.

Period of exposure in hours	**Oxygenic set**			
	Percentage of $ZnSO_4$ added to the PEM			
	0	5	10	20
4	0.25±0.006	0.50±0.009	0.50±0.008	1.50±0.008
8	0.25±0.004	0.50±0.063	0.50±0.114	1.00±0.018
12	0.75±0.108	0.50±0.720	0.25±0.064	0.50±0.062
16	1.00±0.043	0.50±0.014	0.50±0.601	0.75±0.044
20	1.00±0.061	0.50±0.006	0.50±0.005	1.25±0.081
24	1.00±0.042	0.50±0.010	0.25±0.002	1.25±0.001
Period of exposure in hours	Anoxygenic Set			
	Percentage of $ZnSO_4$ in the PEM			
	0.00	0.26	0.50	0.95
24	1.00±0.006	0.75±0.001	0.25±0.004	0.50±0.008

Conclusion

The microscopic observations reveal that when 0.26% or 0.50% $ZnSO_4$ was added, the number as well as the average size of the particles decreased. But when the concentration of $ZnSO_4$ was increased to 0.95%, the number as well as average size of the particle increased. The maximum number was 306 and maximum size was 1.25µ which were observed in the BMJ24 (PUOC) having 0.95%$ZnSO_4$ in the PEM after 20 hours of exposure.

It was observed that in all the four cases of PEM with no additional $ZnSO_4$ and with 0.26%, 0.50% and 0.95% additional $ZnSO_4$ prepared under anoxygenic conditions yield was more as compared to the yield obtained under oxygenic conditions. It was further observed that both under oxygenic conditions and anoxygenic conditions the dry weight decreased gradually when 0.26% or 0.50% $ZnSO_4$ was added but when 0.95% additional $ZnSO_4$ was present, the dry weight increased to a large extent.

Further observation was that when 0.26% or 0.50% of additional $ZnSO_4$ was present the number of the particles decreased But when 0.95% $ZnSO_4$ was present the number of the particles

The average size of the particles was also observed to be maximum when 0.95% additional $ZnSO_4$ was present but their number was exceedingly small.

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