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Surfactant Based Analysis Of Pond Water -A Statistical Approach

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Abstract: Surface-active chemicals are called surfactants. They include the ability to reduce surface tension, stabilize emulsions, and encourage foaming. Surfactants have benefits for a wide range of industries, including food, pharmaceutical, biomedical, cosmetic, and environmental. Surfactants have significant uses in the environment, including as increased oil recovery, Micellar enhanced ultrafiltration (MEUF), and the cleanup and dispersal of oil spills. The current work focuses on the commercial use of surfactants, as well as the advancements and potential applications of various surfactant types in the future.Study of surfactant-based methods for the detection and evaluation of water pollution in diverse lentic ecosystems, including still terrestrial waterways like lakes and ponds. With the aid of surfactants, it all comes together to form a broad study field called freshwater or aquatic ecology.

Index Terms **- Metal concentration,Surfactants, Parameter of water, , Pond water and Micellar enhanced ultrafiltration (MEUF)**

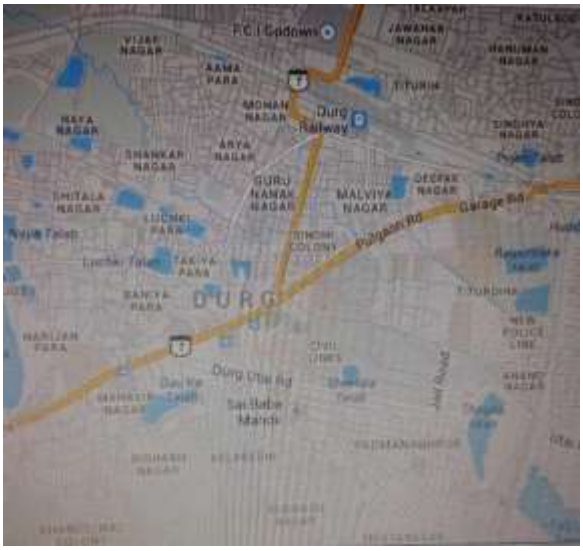
I. INTRODUCTION

II. Ponds are a representation of the lentic environment, and their location is negatively impacted by pollution and population density.Lentic pollution is mostly caused by growing populatios, changing seasons, land use, and land topography.Surface and subsurface water quality has declined as a result of all of these issues (Dhiv iyaa Pranavam, 2011).India is a country of villages, and pond water serves as the primary water source for th e settlements.Pond water is prone to pollution from both point and nonpoint sources, making it imperative to examine its physico-chemical properties. The sources of pollution in ponds are mainly Sewage entry from human settlements, Erosion of soils, eutrophication, dumping of debris silt and nutrients, festival seasons. Durg district of Chhattisgarh situated at $13^{o}4'$ n and $80^{o}5'$latitude with pond water ecosystem lying on the middle. For the district's larger settlements, pond water is the only supply of water.

Due to home activities and customs that every Indian finds to be observed and followed, the quality of the po nd water in Durg is steadily declining.

Pond water analysis is therefore carried out in order to determine the contamination level and provide potenti al solutions for improvement.

III. Fig.1 shows the study area and sampling locations.



Materials and Methods;

Pond water samples were taken from eight distinct ponds in the rural Durg districts. The pond was zoned with Durg City as the center.Throughout the tests, borosilicate glassware and ARgrade r eagents were employed.Oneliter sanitized polyethylene bottles were used to collect the samples, and 5% HN O3 was utilized as a preservative.A laboratory investigation was conducted to determine their physicochemic al characteristics.The samples that were gathered had accurate labels and records (Table 1).There was analysi s of several physiochemical characteristics (Table 2).The titration method was used to measure the water sam ples' total alkalinity and chloride content.The conductometry method was used to determine the water sample 's conductivity.Complexometric titration was used to measure the water samples' overall hardness and metal content.

Aliquot preparation: Two sets of sample were prepared, one for standard reading (without surfactant) and with Surfactant. The surfactant used was Sodium laurel sulphate (SLS).

TABLE:1

S.no.	SAMPLLING SITE name	Site no (PW)
1	Borsi talab	PW-1
2	Hanoda talab	PW-2
3	Hanoda talab main(towards the east)	PW-3
4	Luchki talab	PW-4
5	Polsay para talab	PW-5
6	Shitlamandir talab	PW-6
7	Bsp water tank	PW-7
8	Thagadanahar talab	PW-8

TABLE 2 PARAMETRES ANALYSIED AND METHOD

PARAMETERS	METHOD
Temperature	Thermometer
PH	pH meter
Total Alkalinity	Titration
Total Hardness	EDTA Titration
Total Dissolved Solids	Conductivity +online calculation
Conductivity	Conductivity Meter & water analysis kit
Free acidity	Titration
carbondioxide	Titration

TABLE 3 DATA TABLE;

TABLE:3.1 **Correlation coeffiecent matrix showing relation between desirable parameters without adding surfactant**

	pH	Conductivity	Total Hardeness	Acidity	Free Co2
pH	1				
Conductivity	0.9916	1			
Total Hardeness	-0.9118	0.975	1		
Acidity	0.0072	0.868	-0.01306	1	
Free Co2	-0.5046	0.9511	0.389	0.6732	1
TDS	0.2041	0.999	0.4235	0.3985	0.4349
Alkalinity	0.07356	0.8565	-0.1183	-0.4529	-0.1283
Calcium	-0.6238	0.4335	0.7165	0.4217	0.5979
Magnesium	-0.9041	0.5371	0.9828	-0.1272	0.2971
Copper	-0.1792	-0.7624	-0.0406	-0.3385	-0.1345
Nickel	0.4406	-0.3709	-0.522	0.01405	-0.5532
Iron	-0.1881	0.0494	0.2741	-0.4453	-0.0031

TABLE:3.2 **Correlation coeffiecent matrix showing relation between essential parameter without adding surfactant**

	TDS	Alkalinity	Ca	Mg	Cu	Ni	Fe
TDS	1						
Alkalinity	-0.506	1					
Calcium	0.4099	0.0339	1				
Magnesium	0.3883	-0.1482	0.5756	1			
Copper	-0.813	0.6049	-0.1993	0.0047	1		
Nickel	-0.345	-0.4901	-0.6497	-0.439	0.0624	1	
Iron	0.004	0.6454	0.4334	0.2065	-0.0338	-0.7555	1

TABLE 4 COMPARISION

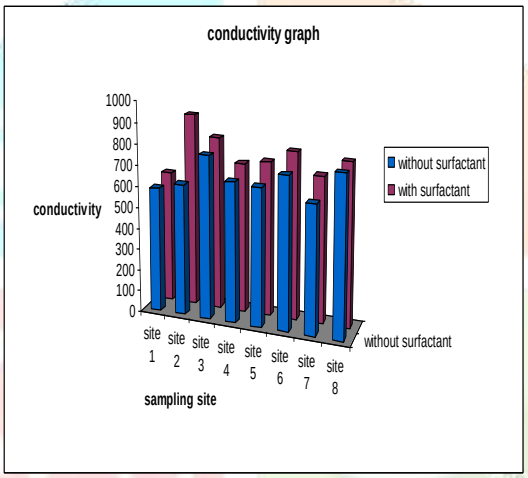
TABLE 4.1; correlation coefficient matrix showing relation between essential parameter by adding surfactant

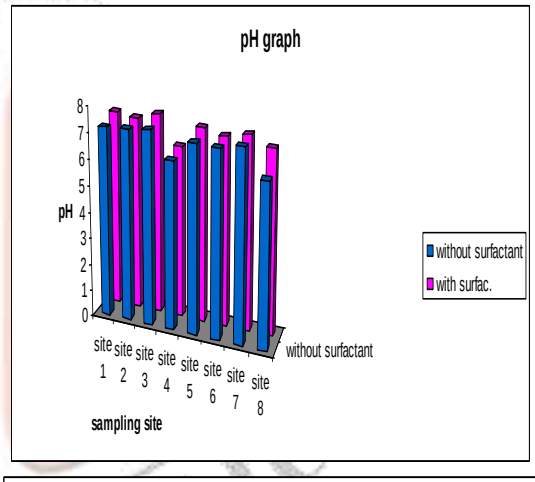
	TDS	Alkalinity	Calcium	Magnesium	copper	Nickel	Iron
TDS	1						
Alkalinity	-0.38	1					
Calcium	0.0068	0.18	1				
Magnesium	0.32	-0.09	0.68	1			
Copper	-0.34	0.58	0.1	0.27	1		
Nickel	-0.3	-0.55	-0.54	-0.48	-0.25	1	
Iron	0.08	0.6	0.58	0.36	0.18	-0.94	1

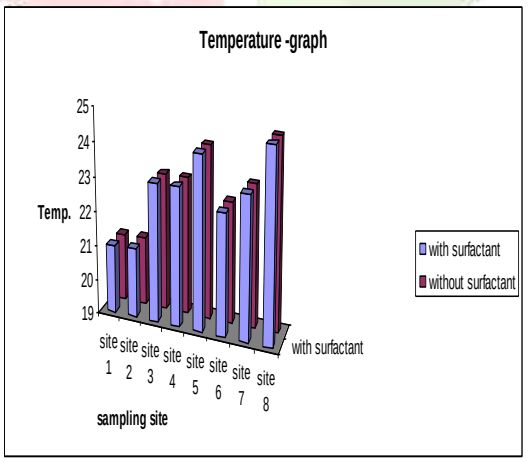
TABLE 4.2 correlation coefficient matrix showing relation between Desirable parameter by adding surfactant

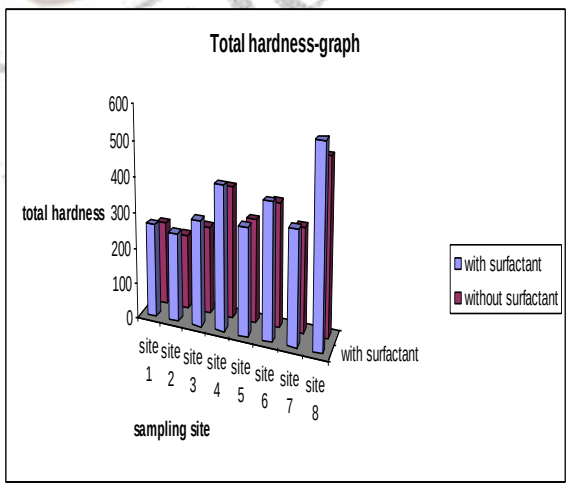
	pH	Conductivity	Total Hardeness	Acidity	Free Co2
pH	1				
Conductivity	0.151	1			
Total Hardeness	-0.76	-0.16	1		
Acidity	-0.33	-0.31	0.73	1	
Free Co2	-0.63	-0.11	0.73	0.51	1
TDS	0.02	0.6	0.27	-0.03	0.42
Alkalinity	-0.09	-0.44	-0.03	0.29	0.09
Calcium	-0.64	-0.53	0.79	0.77	0.73
Magnesium	-0.71	-0.04	0.98	0.66	0.68
Copper	-0.35	0.05	0.25	0.47	0.17
Nickel	0.59	0.11	-0.53	-0.37	-0.55
Iron	-0.5	-0.29	0.44	0.41	0.35

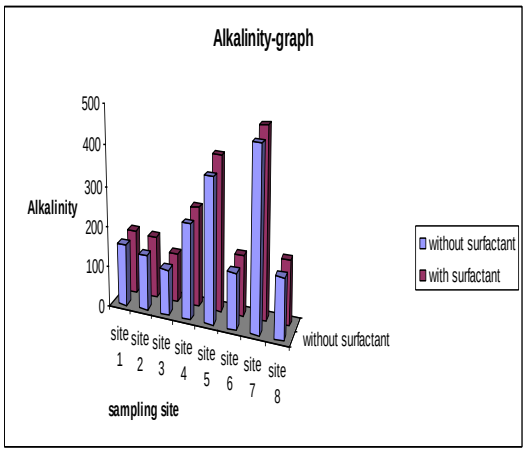
GRAPHS

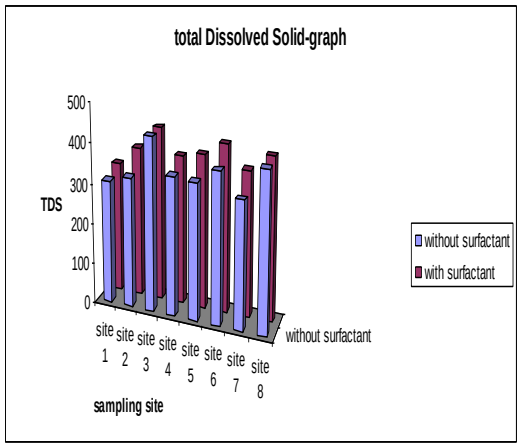


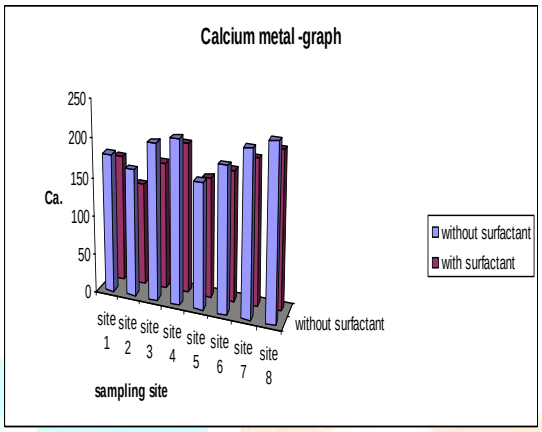


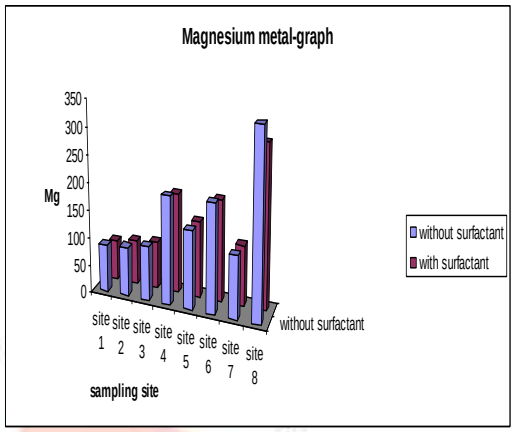


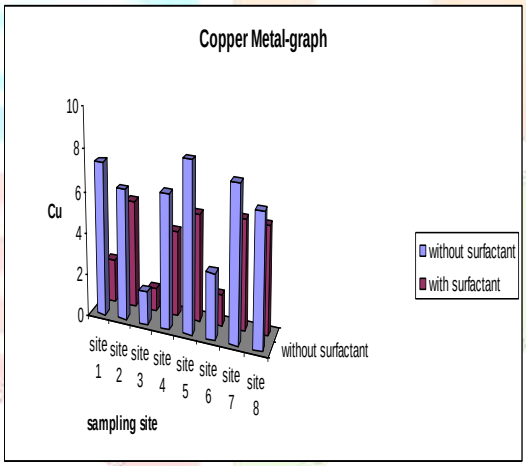


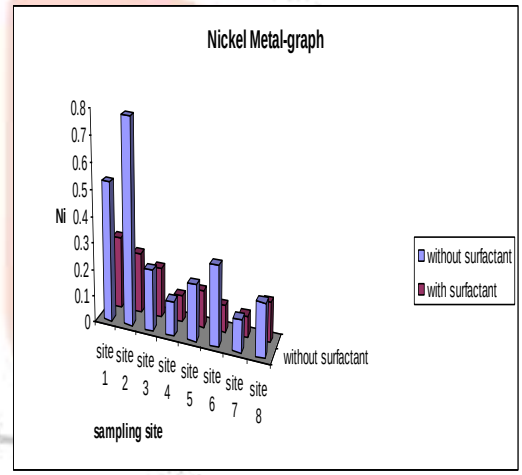

Alkalinity-graph
Alkalinity
500
400
300
200
100
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant

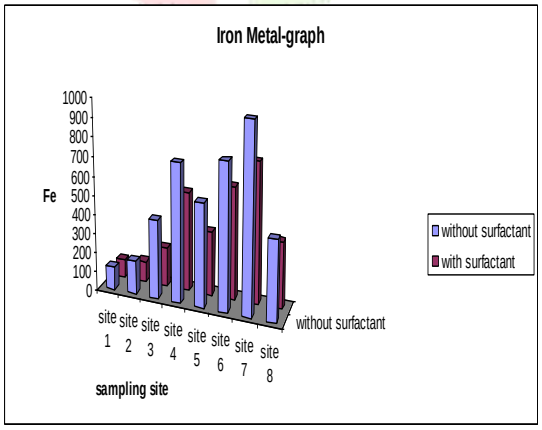

total Dissolved Solid-graph
TDS
500
400
300
200
100
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant

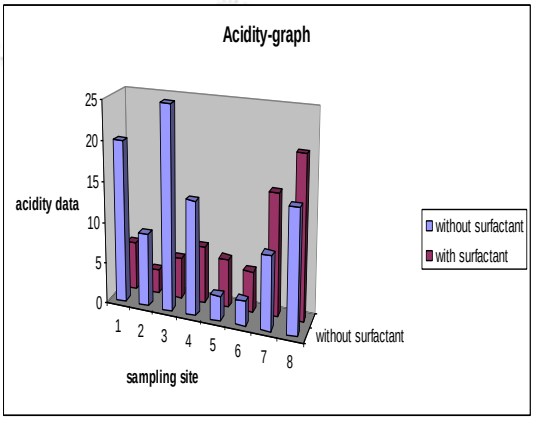

Calcium metal -graph
Ca.
250
200
150
100
50
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant

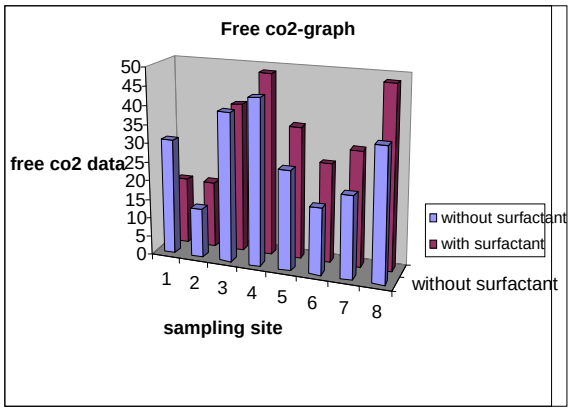

Magnesium metal-graph
Mg
350
300
250
200
150
100
50
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant


Copper Metal-graph
Cu
10
8
6
4
2
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant


Nickel Metal-graph
Ni
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant


Iron Metal-graph
Fe
1000
900
800
700
600
500
400
300
200
100
0
site 1
site 2
site 3
site 4
site 5
site 6
site 7
site 8
sampling site
without surfactant
without surfactant
with surfactant


Acidity-graph
acidity data
25
20
15
10
5
0
1
2
3
4
5
6
7
8
sampling site
without surfactant
without surfactant
with surfactant



RESULT AND DISSCUSION: Every sample had an alkaline pH. The ideal pH range for irrigation water is 6.5 to 8.5, with a maximum of 9 allowed, per David et al. (1996). The correlation data table clearly shows that the pH increased upon the addition of an anionic surfactant.Conductivity improved when a surfactant was added as well. The conductivity and total dissolved solids readings for the plane water sample were identical. The addition of surfactant causes the anionic surfactant to split into ions, which raises conductivity. A decrease in data was seen in the metal analysis scenario, indicating that the metal was ensnared by the surfactant and produced micelles.The sites with the most fluctuations in physiochemical characteristics were site no. 6 (Shitla Mandir Talab) and site no. 4 (Luchki Talab) pond water samples.Their proximity to the temples is the cause of the data's unpredictability.This place is used for a variety of ceremonies, such as hairs, the remains of which are dumped into the pond. Due to carelessness and ignorance, the Durg Ponds are now more vulnerable to eutrophication. Weed growth is a result of eutrophication. The weeds are particularly dangerous for soil, plants, and other species, including humans, because they blocked sunlight and decreased the self-purification process through photosynthesis.

CONCLUSION: The experiment that is being described here simply uses surfactant to investigate the chemical condition of the pond water. Sodium lauryl sulphate is the anionic surfactant that is employed. The contaminated aqueous solution including organic solutes and/or metal ions is mixed with surfactant. At concentrations greater than their critical micelle concentration (cmc), the surfactant produces micelles, which are charged spherical aggregates made up of 50 to 150 surfactant molecules. By means of electrostatic attraction, the metal ions are adsorbed onto the oppositely charged micelle surface. Above their critical micelle concentration, surfactants begin to produce micelles, which capture and help mobilize metal ions from the water sample by adsorption. Complexometric titration is used to confirm this process.

Surfactants can be used to analyze metals, and this technique can also be utilized to extract metals.The following benefits of this technology include: easy operation; minimal energy requirements; high removal efficiency; quick recovery of metal ions; lower cost; and room temperature separation. It is also safer for the environment.

There was severe eutrophication in the pond water. Hindu customs state that ponds close to temples are used more frequently, and as a result, the impurities in the water were mostly oil, unburned cotton, wooden fragments, and other materials, which encouraged the growth of weeds. The weeds hindered sunlight, which decreased photosynthesis, the process by which the body purifies itself. The following rehabilitation techniques might be taken into consideration in order to preserve and stop the deterioration of water bodies:De-silting, de-weeding, preventing sewage effluents from entering the pond, and substituting soil-made idols for plaster of Paris during festivals.

REFERENCES

[1] Dhiviyaa Pranavam TS, Venkatesa Rao T,Punithavathi L, Karunanithi S and Bhaskaran A (2011) *Groundwater pollution in the Palar Riverbed near Vellore, Tamil Nadu, India*. Indian J. Sci.Technol. 4 (1), 19-21.

[2] ICMR Standards (1985) Standards Methods for Examination of Water.5. ISI (1991) Indian standard Drinking Water Specifications, New Delhi, 5, 16.

[3] Laboratory Manual on Water Analysis, National Environmental Engineering Research Institute,Nagpur.

[4] WHO (2004) International standards of drinking water. World Health organization, Geneva. pp:55-79.

[5]Sandeep Arya, Vinit Kumar, Madhullica Raikwar, Anshu Dhaka and Minakshi (2011),"*Physico-Chemical Analysis Of Selected Surface Water Samples Of Laxmi Tal (Pond) In Jhansi City, UP, Bundelkhand Region, Central India"*, Journal of Experimental Sciences 2(8): 01-06.

[6]Navneet Kumar, D.K. Sinha, (2010),"*Drinking Water Quality Management Through Correlation Studies Among Various Physicochemical Parameters: A Case Study*", International Journal Of Environmental Sciences Volume 1, No 2.

[7]Mulligan C.N, yong R N. Gibbs B.F (2001),"*Surfactant-Enhanced Remediation Of Contaminated Soil:A Review*",Engineering Geology 60,371-380

[8]T. Sobisch,(2000),"Surfactant combinations for Enhanced Removal of contaminants", Proceedings of the Seventh International FZK/TNO Conference on Contaminated Soil,Leipzig, pp. 1180 - 1181, Thomas Telford Publishing, Ltd., London.

[9]Rabindra bade,Lee seung Hwan,(2011),"*A Review Of Studies On Micellar Enhanced Ultrafiltration For Heavy Metals Removal Form Waste Water*", Journal of water Sustainability, Volume 1,Issue 1,85-102.

[10]Pusa S.W, Ruzitah M.S and Sharifah A.S.A.Ket al.(2011)," *An Overview Of Micellar – Enhanced Ultrafiltration In Wastewater Treatment Process",* International Conference on Environment and Industrial Innovation, IPCBEE vol.12.

[11]Jin-Hui Huanga ,Guang-Ming Zenga et al.(2010),"*Adsorption Of Surfactant Micelles And Cd2+/Zn2+ In Micellar-Enhanced Ultrafiltration",* Journal of Hazardous Materials 183 (2010) 287–293.

[12] Chuan-Kun Liu and Chi-Wang Li,(2009)," *Recovery Of Copper And DCA From Simulated Micellar Enhanced Ultrafiltration (MEUF)Waste Stream*", World Academy of Science, Engineering and Technology 35.

[13] Gieskes, J. M., and Lawrence, J. R., 1976. Interstitial water studies, Leg 35. In Hollister, C. D.,Craddock, C., et al., Init. Repts. DSDP, 35: Washington, DC (U.S. Govt. Printing Office), 407-424.

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