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# Analysis of Water Consumption Using Stearyl Alcohol

P. Rajkumar[1], M. Selvakumar[2], P. Karthick[2], T. Burusoth[2]
[1]*AssistantProfessor, Department Of Mechanical Engineering, Arjun College Of Technology-Coimbatore*
[2]*U.G. Scholars, Department of Mechanical Engineering( Final year), Arjun College Of Technology- Coimbatore*

***Abstract:*** ***The huge quantities of water are lost from lakes, reservoirs and soils by evaporation. This assumes greater significance in arid and semi-arid regions around the globe when a general scarcity of water is compounded by high evaporation loss from the open water surfaces of lakes and dam. The use of surface covering by a monomolecular film to reduce evaporation loss from large open water surfaces offers the greatest promise among all currently available techniques. This is the only system that retains the water surface in a state that does not interfere with other uses of the body of water such as boating, navigation recreation, fish, and wildlife propagation. Various experiments and field trials worldwide have proven conclusively that the fatty alcohols and their emulsions effectively retard water evaporation and result in sav- ing to the tune of about 20% to 50%. An experiment was carried out at using a mixture of Cetyl and Stearyl alcohol that confirmed 19.26% saving in evaporation loss. During this three days, about 0.18 mcum of water was saved which otherwise might have evaporated.***

***Keywords: Evaporation, WaterEvaporationRetardant , stearyl alcohol, cetyl alcohol***

## I. INTRODUCTION

The rapid increase in world population and per capita consumption of water due to rising standards of living and other levels of activity have greatly intensified the demand for water all over the world. Evaporation plays a major role in the hydrologic cycle, and about 50% to 75% of total rainfall lost to the atmosphere . This assumes greater significance in arid and semi-arid regions. The situation becomes grave, especially during droughts, when a general scarcity of water is compounded by high evaporation losses from the open water surfaces of lakes and reservoirs. The National Water Commission Waterlines documents annual evaporation losses in Australia as potentially exceeding 40% of total water storage. Evaporation is a type of vaporization of water that occurs on the surface of liquid. Water evaporation is the process of escaping water molecules from the water surface into the atmosphere. Evaporation is greatest during the driest seasons which are also the peak periods of water use . Management of water by reducing the evaporation rates will optimize the amount of water that may support the ever-growing domestic, agricultural and industrial demands. Hence, potentially all of the evaporation controlling methods can be of great economic significance . (Stearyl alcohol) CH3(CH2)16CH2OH are suitable fatty alcohols to use for monolayers . These alcohols are derived from coconut or palm oil and are tasteless, odorless, non-toxic and inflammable. stearyl alcohol and their derivatives are biodegradable and innocuous to humans and animals. The United States Food and Drug Administration have approved them for use in the cosmetic, food and medicinal and industries indicating none to no toxicity **.**

## II. EVAPORATION

Evaporation is a different process to boiling. The first surface effect that happens at any time, while the latter bulk transformation that only happens when the conditions are correct . Technically the water is not turning into a gas, but random movement of the surface molecules allow some of them enough energy to escape from the surface into the air

### *A. Factors Affecting Evaporation*

Evaporation is a process by which a liquid changes into vapour from. water molecules are in constant motion and some have the energy to break through water surface and escape into air as vapour. Evaporation in general is a beneficial phenomenon in regulating global water balance through the hydrological cycle and it is the same phenomenon contributing to massive losses from water bodies

*1)* Water surface area

*2)* Temperature
*3)* Vapour pressure difference
*4)* Atmospheric pressure
*5)* Quality of water

*B. Factors Reducing Evaporation*

The methods of evaporation can be grouped under two broad categories
*1)* Short term measures
*2)* Long term measures

*C. The Methods Generally Used Or Being Tried Are Broadly Listed Below*

*1)* Wind Breakers
*2)* Convering the water surface
*3)* Reduction of exposed water surface
*4)* Underground storage of water
*5)* Treatment with chemical Water Evaporation Retardants

Fig.1. Dam Layout

WATER

| S.NO | PARAMETER OF WATER |
|---|---|
| 1. | Alkalinity as $CACO_3$ |
| 2. | Chlorude as CI |
| 3. | Sulphate as $SO_4$ |
| 4. | Iron as Fe |
| 5. | Nitrate as $NO_3$ |
| 6. | Fluride as F |
| 7. | Oil& grease |
| 8. | Bod |
| 9. | Cod |

Table.1 Physical Parameter

| S.NO | PHYSICAL PARAMER |
|---|---|

| | |
|---|---|
| 1. | Odour |
| 2. | Turblity |
| 3. | Ph |
| 4. | Electrical conductivity |

Table.2 Chemical Parametr

| S.NO | CHEMICAL PARAMETER |
|---|---|
| 1. | Disolved solids |
| 2. | Hardness |
| 3. | Cacium (ca) |
| 4. | Magnesium (mg) |

Table.3 Stearyl Alocohol

Stearyl alcohol is on organic compound with the formula $CH_3(CH_2)_{16}CH_2OH$ . it is classified as a fatty alcohol. It takes the form of white granules or flakes, which are insoluble in water .it has a wide range of uses as ingredient in lubricants, resins, perfumes and costimatics. It is used as an emollient. Emulisifer ,and thickner in oilments. It also found suppressing monolayers. Stearyl Alcohol Properties

| | |
|---|---|
| Chemical formula | $C_{18}H_{38}O$ |
| Molar mass | 270.49 / mol |
| Appearance | White solid |
| Melting point | 59.4 to 59.8°c (138.9 to 139.6° F), (332.5 to 332.9K ) |
| Density | 0.812 g/cm$^3$ |
| Boiling point | 210°C (410 F - 483 K) at 15mm hg(2.0 kpa) |
| Solubility in water | $1.1\times10^{-3}$ mg |
| Flash point | 185°C (365 F 458 K) |

Table.4

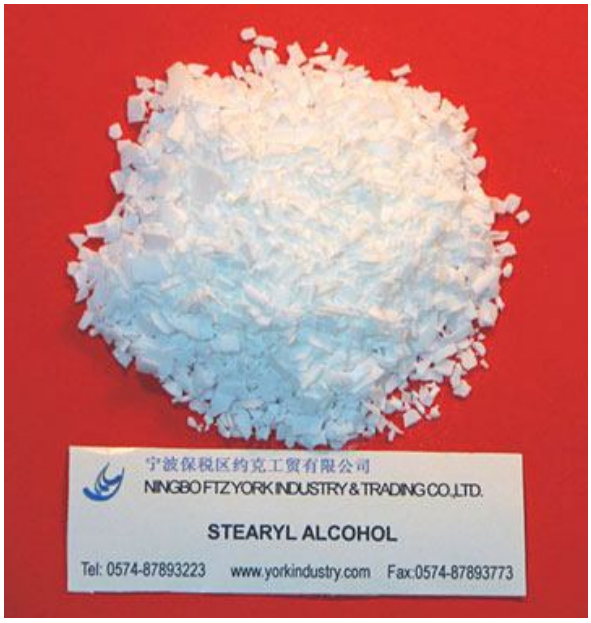


Fig.2. Evaporation control using stearyl alcohol

*A. Biological Properties*

common constituent of mam- malian tissues. Results from several studies indicate that Stearyl Alcohol is poorly absorbed from the gastrointestinal tract. For a review of the literature written from the years 1933 to 1978 Stearyl Alcohol is found naturally in various mammalian tissues. This fatty al- cohol is readily converted to stearic acid, another on the absorption, metabolism, and excretion of Stearyl Alcohol.

## III. WATER AND STEARYL ALOCHOL MIXING RATIO

The water tested on dam water sample in one squre glass box in testing level . a water testing normal water in before tested next in after tested in stearyl alcohol mixed in squre glass in water in one one litre water 5ml stearyl alcohol mixing the water . so water evaporation reduced in alcohol.the water 20% to 50% saved the water.

The monomolecular film formed by a mixture of Stearyl alcohols in 1:5ml provides a stronger and more stable film on water surfaces than single Water Evaporation Retardant (WER) material

Fig.4.mixing ratio in stearyl alcohol

Fig.4..before test the water

Fig.5. After mixing 0f stearyl alcohol in water

*A. Before Testing Report*

| | | | |
|---|---|---|---|
| Sample details | Dam water sammple | | |
| Sampling procedure | Is 3025 part 1 | Sample received on | 05.02..2017 |
| Sample collected by | customer | Sample reported on | 12.02..2017 |

Physical Parametrs

| S.NO | PARAMETER | PROTOCOL | UNIT | RESULT | LIMITS DESIRABLE |
|---|---|---|---|---|---|
| 1. | ODOUR | IS 3025(P-5)1983 (RA-2002) | - | Agreeable | Agreeble |
| 2. | turbidity | IS 3025(P-10)1983 (RA-2002) | NTU | 0.2 | 10 |
| 3. | Ph at $25^0$c | IS 3025(P-11)1983 (RA-2002 | - | 6.65 | 6.5-8..5 |
| 4. | Electrical conductivity | 2510 B AHA 22nd edition 2012 | (µmhos/cm) | 330 | - |
| | CHEMICAL PARAMETER | | | | |
| 5. | Total dissolved soils | ID 3025(p-16) 1984 (RA 2006) | Mg/l | 190 | 2000 |
| 6. | Total hardness as caco3 | 2340 C APHA 22nd edition 2012 | Mg/l | 72 | 600 |
| 7.. | Calcium as a | IS 3025 (P-40) 1991 (RA 2003) | Mg/l | 25.7 | 200 |
| 8. | Magnesium as mg | 3500 mg B APHA 22nd Edition 2012 | Mg/l | 1..94 | 100 |

| | | | | | |
|---|---|---|---|---|---|
| 9. | Calcium as caco3 | 3500 ca B APHA 22nd Edition 2012 | Mg/l | 63 | - |
| 10. | Magnesium as caco3 | 3500 mg B APHA 22nd Edition 2012 | Mg/l | 8 | - |
| 11. | Total alkalinity as caco3 | IS 3025 (P-23) 1986 (RA-2003) | Mg/l | 20 | 600 |
| 12. | Chloride as cl | IS 3025 (P-32) 1988(RA-2003) | Mg/l | 45 | 1000 |
| 13. | Sulphates as so4 | 4500 $so_4^{2-}$ E APHA 22nd edition 2012 | Mg/l | 12.5 | 400 |
| 14. | Iron as Fe | 3500 Fe B APHA 22nd edition 2012 | Mg/l | 0.02 | 0.3 |
| 15. | Nitrate as Fe | IS 3025 (P-34) 1988 (RA-2003) | Mg/l | 0.14 | 45 |
| 16. | Fluride as F | 4500 F-D APHA 22nd edition 2012 | Mg/l | BDL | 1..5 |
| 17. | Free residual chlorine $cl^-$ | 4500 CI-B APHA 22nd edition 2012 | Mg/l | BDL | 1.0 |
| 18. | silica | | Mg/l | 0.16 | |
| 19. | Oil& grease | Is 3025 (P-39) 1991 (RA-2003) | Mg/l | NIL | 10 |
| 20. | BOD@ $27^0$C | | Mg/l | 3.9 | |
| 21. | COD | | Mg/l | 16 | |

*B. After Testing Report*

| | | | |
|---|---|---|---|
| Sample details | Dam water sample After stearyl alcohol in mix water | | |
| Sampling procedure | Is 3025 part 1 | Sample received on | 05.02..2017 |
| Sample collected by | customer | Sample reported on | 09.02..2017 |

Physical Parametrs

| S. NO | PARAMETER | PROTOCOL | UNIT | RESULT | LIMITS DESIRABLE |
|---|---|---|---|---|---|
| 1. | ODOUR | IS 3025(P-5)1983 (RA-2002) | - | Agreeable | Agreeble |
| 2. | turbidity | IS 3025(P-10)1983 (RA-2002) | NTU | 0.2 | 10 |
| 3. | Ph at $25^0$c | IS 3025(P-11)1983 (RA-2002 | - | 7.3 | 6.5-8..5 |
| 4. | Electrical conductivity | 2510 B AHA 22nd edition 2012 | (µmhos/cm) | 421 | - |
| | CHEMICAL PARAMETER | | | | |
| 5. | Total dissolved soils | ID 3025(p-16) 1984 (RA 2006) | Mg/l | 195 | 2000 |
| 6. | Total hardness as caco3 | 2340 C APHA 22nd edition 2012 | Mg/l | 84 | 600 |

| | | | | | |
|---|---|---|---|---|---|
| 7.. | Calcium as a | IS 3025 (P-40) 1991 (RA 2003) | Mg/l | 25.7 | 200 |
| 8. | Magnesium as mg | 3500 mg B APHA 22nd Edition 2012 | Mg/l | 1.27 | 100 |
| 9. | Calcium as caco3 | 3500 ca B APHA 22nd Edition 2012 | Mg/l | 64 | - |
| 10. | Magnesium as caco3 | 3500 mg B APHA 22nd Edition 2012 | Mg/l | 7.4 | - |
| 11. | Total alkalinity as caco3 | IS 3025 (P-23) 1986 (RA-2003) | Mg/l | 24 | 600 |
| 12. | Chloride as cl | IS 3025 (P-32) 1988(RA-2003) | Mg/l | 47 | 1000 |
| 13. | Sulphates as so4 | 4500 $so_4^{2-}$ E APHA 22nd edition 2012 | Mg/l | 12.4 | 400 |
| 14. | Iron as Fe | 3500 Fe B APHA 22nd edition 2012 | Mg/l | 0.02 | 0.3 |
| 15. | Nitrate as Fe | IS 3025 (P-34) 1988 (RA-2003) | Mg/l | 0.17 | 45 |
| 16. | Fluride as F | 4500 F-D APHA 22nd edition 2012 | Mg/l | BDL | 1..5 |
| 17. | Free residual chlorine $cl^-$ | 4500 CI-B APHA 22nd edition 2012 | Mg/l | BDL | 1.0 |
| 18. | silica | | Mg/l | 0.16 | |
| 19. | Oil& grease | Is 3025 (P-39) 1991 (RA-2003) | Mg/l | NIL | 10 |
| 20. | BOD@ $27^0$C | | Mg/l | 3.8 | |
| 21. | COD | | Mg/l | 14.7 | |

## IV. ADVANTAGES

*A.* The cost for the transportation of 10,000 of litres water came to $7.0 by road and $3.0 by rail while the cost of water savings by this experiment was $0.45.

*B.* The monthly average maximum temperature varies from 25˚C to 42˚C and the minimum temperature varies between 8˚C to 27˚C. Usually, the daytime.

*C.* Rises from forenoon to the afternoon and then gradually falls. During the summer months where the maximum daytime temperature ranges from 40˚C to 45˚C, evapora- tion losses

*D.* An experiment was carried out at the dam by using a mix of Cetyl and Stearyl alcohol, which confirmed a saving of 19.26% in evaporation loss. During this six-month trial, 0.18 mcum of water was saved from being evapor

## V. APPLICATIONS

*A. Nonionic Surfactants*

*B. Water Saving The All Dames*

*C. Chemical Intermidiates*

*D. Flavor And Fragrance*

## VI. CONCLUSION

Per day 20% to50% water saved on dam Thus we find finally the water and stearyl alchocal mixture is not affect the human life and aquatic life we are directly used this mixture into all the domestic purpose and using method of reverse osmosis

its used as a drinking water not be affected. The application of this mixture is used for plant cultivation.

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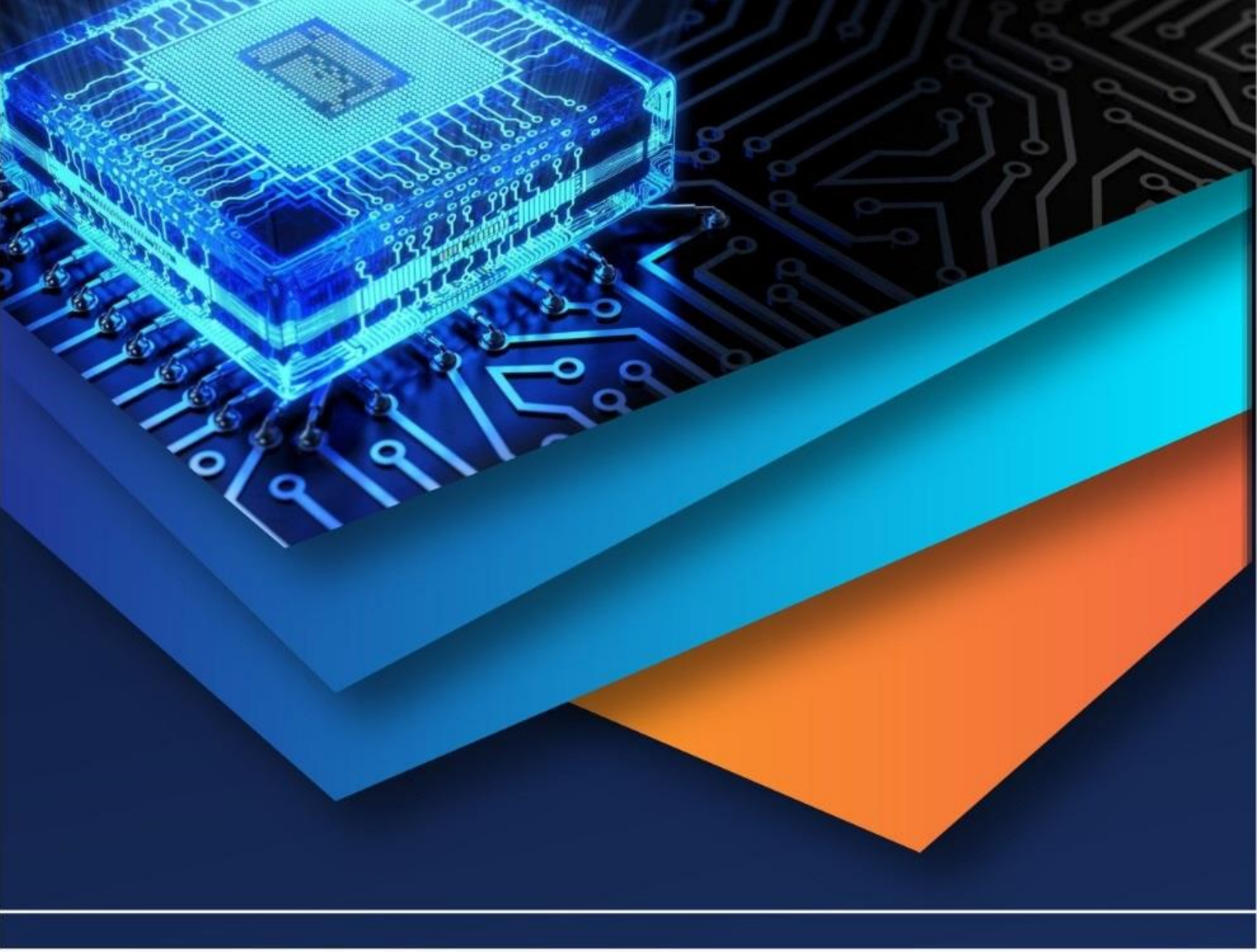

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