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COMPARATIVE STUDY ON DESALINATION OF SEA WATER FOR CONSTRUCTION & DOMESTIC PURPOSE

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Abstract
Water is the basic need which is used for domestic purposes as well as numerous other varied industrial applications. The increasing amount of discharged sewage, urbanization, use of chemicals in agriculture and various anthropogenic activities affects the quality of underground water. The availability of fresh water sources is limited .sea water accounts for 97% of earth's water. The main drawback is their high salinity. In the face of rising water demands and decrease in freshwater supplies, alternative water sources are needed. Desalination of water has become a key to helping meet increasing water needs, especially in water-stressed countries where water obtained by desalination far exceeds supplies from the freshwater sources. Recent technological advancements have enabled desalination to become more efficient and cost-competitive on a global scale. This has become possible due to the improvement in the materials used in membrane-based desalination, incorporation of energy-recovery devices to reduce electricity demands, and combining different desalination methods into hybrid designs. Further, there has been a gradual phasing- in of renewable energy sources to power desalination plants, which will help ensure the long-term sustainability of desalination. However, there are still challenges of reducing energy demands and managing waste products from the desalination to prevent adverse environmental effects. From this project, we will get an idea on desalination technology that is used in India, production cost of desalination plant and factors influencing cost of water and the study methods involved in desalination.

Keywords: Desalination, Environmental Study, Energy, Hybrid

1. INTRODUCTION:

Desalination can be defined as any process which removes excess salts and minerals from water (or) the chemical process of changing seawater into potable water are called desalination

Desalination is a water supply option that is used widely around the world and involves taking the salt out of the water to make drinkable. Many countries use desalination as a way of creating a more reliable water supply that is not depended on rain.

2. Literature Review:

Three-fourths of the earth's surface is covered with water. Out of this three-fourths, only 0.6 percent is found in the form of lakes and rivers [1]. The rest is

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found in the form of salt water in oceans, which cannot be directly used for human consumption. The world's population is expected to reach 8.1 billion by the end of 2025 [2].

With depleting fresh water sources, additional water supplies will be important in determining the future of humans on this planet. Like fossil fuel resources, the need for water is likely to be a major factor for world stability in the coming few years [3, 4]. There are technological innovations being made, as well as new water sources being explored, to cater to the growing water demand around the world. If used efficiently, the concept of desalination is a very viable option for addressing the problem of water scarcity.

Desalination is slowly becoming a popular concept among the public. The worldwide desalination industry is expected to grow 140 percent over the next decade, with 25 billion United States Dollar (USD) in capital investment by 2010 and 56 billion USD by 2015 [5].

Thermal methods of desalination such as multistage flash (MSF) and multiple-effect distillation (MED) have been found successful in converting seawater into pure water, but the energy required for this process makes it unviable to be used on a large scale. Membrane technology, such as reverseosmosis (RO), suffers from membrane fouling and a high rate of brine production [6]. Current methods of brine disposal cause major environmental problems. Therefore, research is continually being carried out in order to find out the sustainable way of desalting seawater.

3. METHODOLOGY:

Thermal Desalination

Thermal desalination methods use thermal energy to increase the temperature of the saline waterfeed.

Thermal desalination utilizes the heat from combustion, power block, or even renewableenergy to evaporate sea water it is an energy-intensive distillation process requiring both thermal and electrical energy

In this saline water is pumped preheated and enters the stage under vacuum, a flash separation then takes place, and the water vapour is condensed and collected as fresh water. The feed seawater passes through the heat exchangers after the last stage to increase its temperature and reduce the energy needed for heating it up. The number of stages can vary from 4 to 40, enabling MSF systems to produce water volumes of the order of 10,000 to 40,000 m3/day.

The stages have lower temperatures and pressures successively. The heating of the feed is fromlow-pressure steam (~ 2.5 bar and ~ 200°C), and the vacuums required in the stages are provided by generators working with medium-pressure steam. In addition to thermal energy, MSF requires separate pumps for seawater input and a freshwater output; hence, electrical energy sources are required. Around 26% of the worldwide desalination processes are MSF, making it the most popular non membrane desalination technology.

4. RESULT AND CONCLUSION:

	CT value (mg·min/l)		
Disinfectant	2 log	3 log	4 log
Chlorine[a]	3	4	6
Chloramine[b]	643	1067	1491
Chlorine dioxide[c]	4.2	12.8	25.1

[a] Based on 10 °C, pH 6–9, free chlorine residual of 0.2–0.5 mg/l.
[b] Based on 10 °C, pH 8.
[c] Based on 10 °C, pH 6–9.

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Temperature (°C)	CT value (mg·min/l) 2 log	3 log	4 log
5	857	1423	1988
10	643	1067	1491
15	428	712	994
20	321	534	746
25	214	356	497

Here **CT**: product of disinfectant concentration (C) and contact time (T)

Sample-1 : kakinada locality

Sample-2 : Upadda

Sample-3 : Yannam.

5. CONCLUSION:

Due the scarcity of water in the world as a civil engineer we have to introduce the DESALINATION process to avoid the scarcity and problems occurred due the less water.

Through the above results the desalination process is done in THERMAL DESALINATION and REVERSE OSMOSIS processes. By doing this process we know that sea water or salt water is use for Domestic purposes and construction purposes .

- Based on the analysis of the economics of thermal and membrane desalination processes Membrane (RO)process was an high efficient.
- conclusions can be drawn. Increasing plant capacity drastically decreases overall unit product cost, despite on production rate
- overall increase in the capital cost (i.e., economy of scale). The unit product cost for the RO process consists of less cost
- approximately equal contributions of the fixed charges, power costs and membrane replacement costs; are both in same weight
- The results of product water cost calculations (4.4LE– 20.9LE/m3) agreed well with actual operational data.

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6. REFERENCES:

1. B. L. Pangarkar, M. G. Sane, and M. Guddad, "Reverse osmosis and membrane distillation for desalination of groundwater: a review," ISRN Materials Science, vol. 2011, Article ID 523124, 9 pages, 2011
2. K. Sampathkumar, T. V. Arjunan, and P. Senthilkumar, "Water desalination by solar energy," in Wastewater Reuse and Management, S. K. Sharma and R. Sanghi, Eds., pp. 323–351, Springer, Amsterdam, The Netherlands, 2013.
3. Central Pollution Control Board, Status of Water Treatment Plants in India, Central Pollution Control Board.
4. S. Suryanarayanan, "Water Security: Old Problems, New Solutions," 2011.
5. H. Subramaniam, Fresh from the Sea, The Hindu, Chennai, India, 2013.(for ARTICLE purpose)
6. Development of antifouling reverse osmosis membranes for water Treatment: a review, Guo-dong kang, Yi-ming Cao, water research 46(3), 584-600,2012.
7. Review of reverse osmosis membranes and transport models, Mohammad soltanieh, WILLIAM N GILL', Chemical Engineering Communications 12(4-6),279-363, 1981.
8. Thermodynamics of hyperfiltration (reverse osmosis): criteria for Efficient membranes, KS Spiegler, O_Kedem, Desalination 1 (4), 311-326, 1966.

9. Reverse osmosis desalination: water sources, technology, and today's Challenges, Lauren F Greenlee, Desmond F Lawler, Benny D Freeman, Benoit Marrot, Phillippe Moulin, Water Research 43 (9), 2317-2348,2009
10. In his Hexaemeron, Homily IV, § 7, St. Basil of Caesarea (c. 329–379 AD) mentioned that sailors produced fresh water via distillation. Saint Basil with Sister Agnes Clare Way, trans., Saint Basil Exegetic Homilies (Washington, DC: The Catholic University of America Press, 1963), p. 65. From p. 65:"Moreover, it is possible to see the water of the sea boiled by sailors, who, catching the vapors in sponges, relieve their thirst fairly well in times of need."
11. Seawater Desalination – Impacts of Brine and Chemical Discharge on the Marine Environment. Sabine Lattemann, Thomas Höppner. January 1, 2003.

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