

COOLING WATER- 'PROBLEMS AND SOLUTIONS'

Course Content

PART I - COOLING WATER SYSTEMS – AN OVERVIEW

Water with some exceptional thermal and physical properties happened to be the most readily available medium, and is comparatively an economically viable coolant.

It is however reckoned that the quality of water, with regard to dissolved chemical constituents varies from source to source.

The primary cooling water sources could be any of the followings:

1. Surface Water: - Rivers, reservoirs, streams, lake or ponds.
2. Ground Water: - Shallow or deep well waters
3. Saline Water: - Sea, oceans or salty lake
4. Waste & Effluent Water: - Municipal waste, Industrial effluents, Gray water, Sewage

In General

- Surface water is fed from rain or streams. It contains considerable amount of dissolved suspended impurities.
- Lake water has more or less constant chemical analysis. It usually contains lesser amount of dissolved materials but has large quantities of organic matter.
- Spring or well water is cleaner in appearance but contains most of dissolved salts. These usually have high organic purity.
- The ground water supplies contain less suspended matter than the surface water supplies.
- Seawater is the most impure form of natural water. Seawater contains on average 3-5% of dissolved salts out of which 2.6% is NaCl.
- Because of environmental regulations of zero plant discharge, water cost and water scarcity, some plants use saline or effluents as cooling water.

Type of Cooling Systems

The salient features of three common cooling systems is described below:

1) Open Re-circulation Systems: Cooling Towers, Spray Ponds, Fountains

- The water is cooled as a result of evaporation, in direct contact with air.

Cooling Water Problems And Solutions

**American Institute of Chemical
Engineers**



Cooling Water Problems And Solutions:

Cooling Water Problems and Solutions Anuj Bhatia, 2015-02-28 The three primary reasons that the cooling water treatment may be required are to control corrosion scale formation and the growth of biological agents Any of these problems or more usually a combination of them can cause a loss of efficiency shorten equipment life and push up operating costs Imagine the large amounts of dollars lost when insufficient cooling suddenly curtails operations of process equipment s A very high percentage of people responsible for operation and maintenance of cooling water systems have little or no knowledge of water technology and are therefore totally reliant on specialist water treatment companies to provide up to date cost efficient water treatment programs suitable for their particular plants This 5 hr Quick Book presents an overview of common chemical treatment program that may be required to maintain cooling water systems in good operating condition Reasons and means are discussed for controlling scale deposition corrosion and biological fouling The discussion also covers the information on chemicals used for control and methods available to permit operation within the limits The course is divided in four 4 sections and three 3 annexures SECTION 1 SCALE INHIBITION SECTION 2 CORROSION INHIBITION SECTION 3 BACTERIAL MICROBIOLOGICAL CONTROL SECTION 4 WATER TREATMENT EQUIPMENT AND CONTROLS Annexure 1 Characteristics of some common scale inhibitors Annexure 2 Typical dosage rates pH range and characteristics of common corrosion inhibitors Annexure 3 Typical dosage rates pH range and characteristics of common biocides The course is applicable to engineers and designers involved in power plants oil and gas chemical and petrochemical process facilities refineries industrial plants and HVAC systems in commercial buildings The reader must take a multiple choice quiz consisting of twenty five 25 questions at the end to enhance course learning Learning Objective At the conclusion of this course the student will 1 Understand the critical parameters such as conductivity TDS pH alkalinity and saturation index applicable to cooling water treatment 2 Understand the factors responsible for scale and corrosion 3 Understand the types of scale and methods to minimize its formation 4 Understand relationship between the cycles of concentration and blowdown 5 Understand the physical methods of treating water such as softener dealkalizer ion exchanger filtration and electronic de scaling equipments 6 Understand the corrosion types and the control techniques to mitigate corrosion 7 Learn four types of corrosion inhibitors including anodic cathodic mixed and adsorption types 8 Understand the principles of cathodic protection 9 Learn the possible types of biological fouling and the treatment methods including oxidizing and non oxidizing biocides 10 Understand the chemical feed equipment for closed and open cooling water systems 11 Learn the five application methods for dosing chemicals including their benefits and limitations 12 Learn the control sensors and monitoring devices used in cooling water treatment

Treatment of cooling water Aquaprox, 2009-12-12 Many cooling systems use water as cooling medium They are found in public buildings industrial production systems or power plants Almost every cooling system using water is degraded by deposition corrosion and microbiological fouling This book identifies the whole bunch of problems due

to water cooling systems and proposes specific solutions to all of them The authors have an expertise of over 20 years solving cooling water problems In this book they advise all practitioners which need to plan buy or operate cooling systems

Solutions To Boiler and Cooling Water Problems C. D. Schroeder,1991 A problem solving manual for those who manage boilers and or cooling water units in commercial and industrial plants It is particularly useful to plant operators who have mechanical engineering backgrounds only because essentials of water chemistry as well as mechanical factors are covered The ne *Mathematical Solution of Problems on Thermal Processing of Canned Food* Charles Olin Ball,1928

The Electrical Engineer ,1907 *A.I. Ch. E. Student Contest Problems and the Prize Winning Solutions, 1932-1949* American Institute of Chemical Engineers,1950 *Geological Survey Water-supply Paper* ,1955 *The Joy of Home Distilling* Rick Morris,2014-10-21 The complete guide for beginner and intermediate distillers Make your own brew at home If you re going to invest the 100 or so to get a basic equipment and recipe kit then you ll want to take care in ensuring that your first batch is brewed correctly Rick Morris HowBrewBeer The Joy of Home Distilling is covers nearly every facet of distilling Step by step instructions for the different processes from bucket to bottle The difference between spirit types and how to produce each What yeast is what it does and how to ensure that you get a strong complete fermentation What distillation is and common misconceptions about the process Legalities surrounding distilling alcohol at home Carbon filtering when it s necessary when to filter and why you filter Flavoring and aging your spirits Keeping safety first when working with flammable materials such as ethanol Yeast styles and nutritional requirements Different methods of distillation and equipment Post distillation process And of course fun drink recipes Try the Mudslide or the Cherry Bomb Author Rick Morris who has been selling distillation equipment for over 25 years even includes his own recipes for different types of spirits and drink recipes By learning not just how to distill but also what is happening at each step and why it is needed readers will be armed with the information they need to experiment with their own spirits and concoct their own recipes Easy to understand even for a first time distiller The Joy of Home Distilling is sure to become your number one distilling resource *Scientific and Technical Aerospace Reports* ,1981 *International Bulletin of Information on Refrigeration* International Institute of Refrigeration,1925 **Industrial Refrigeration** ,1926 **Ice and Refrigeration** ,1926

Papers Presented at North Carolina Environmental Workshop, Pinehurst, North Carolina, October 16-17, 1970 ,1970 **Engineering and Mining Journal** ,1928 **Hydrocarbon Processing** ,1987 September 1 2021 Since 1922 management and technical professionals from petroleum refining gas processing petrochemical chemical and engineer constructor companies throughout the world have turned to Hydrocarbon Processing for high quality technical and operating information Through its monthly magazine website and e newsletters Hydrocarbon Processing covers technological advances processes and optimization developments from throughout the global Hydrocarbon Processing Industry HPI Hydrocarbon Processing editors and writers provide real world case studies and practical information that readers can use to improve

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