

## Ethylene Glycol Solution

National Bureau of Standards Circular  
Effect of Mono Ethylene Glycol Solution on Mechanical Behavior of a Clay Soil

The corrosion behavior of aluminum, copper, and iron in inhibited ethylene glycol-ASTM corrosive water solutions was evaluated in a laboratory loop under isothermal and heat-flux conditions for 1000 h at temperatures between 378 and 413/sup 0/K, in static autoclave tests at 450/sup 0/K for 500 h, and by potentiodynamic polarization measurements at temperatures between 298 and 348/sup 0/K. The effect of time, temperature, and ethylene glycol concentration of the heat-transfer fluid on the extent of inhibitor depletion was determined from analyses of the reserve alkalinity, pH, and inhibitor content of the solutions. The performance of an electrochemical sensor as a monitor of fluid quality was also evaluated. A heat flux of 0.4 to 1.0 kW/m/sup 2/ did not have a significant effect on the corrosion behavior of the various materials at temperatures between 378 and 413/sup 0/K. The corrosion rates of aluminum, copper, and iron in the 50 volume percent inhibited ethylene glycol-corrosive water solution decreased as a function of time during the 1000-h test. At 413/sup 0/K, the corrosion rate of copper was considerably higher than that of iron or aluminum at low flow velocity. Significant degradation of the fluid quality, as indicated by the measurement of the pH, reserve alkalinity, and inhibitor concentrations, occurred after several hundred hours at temperatures of approx. 450/sup 0/K.

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**A Systematic Study to Investigate the Effect of Concentration on Flow Boiling Heat Transfer Characteristics in Water Ethylene Glycol System Antifreeze Solutions in Home Fire Sprinkler Systems Patents**

### **Code of Federal Regulations**

The Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

Ethylene Glycols: Advances in Research and Application: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Ethylene Glycols. The editors have built Ethylene Glycols: Advances in Research and Application: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Ethylene Glycols in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Ethylene Glycols: Advances in Research and Application: 2011 Edition has been produced by the world's leading scientists, engineers,

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Corrosion Behavior of Several Metals in Ethylene Glycol-base Heat-transfer Fluids Under Conditions Encountered in Solar Energy Systems

Industrial & Engineering Chemistry

Official Gazette of the United States Patent and Trademark Office

Poly(Ethylene Glycol) Tailored Polymers

Dechlorination of Polyvinyl Chloride in NaOH and NaOH/Ethylene Glycol Solution by Microwave Heating

The present work is addressed primarily to the study of the effects of glycol aging at elevated temperatures (above 100°C). Glycols are known to be susceptible to thermal decomposition producing new product species which may be aggressive to aluminum. In addition, the possible breakdown of corrosion inhibitors due to long term exposure to high temperature are also investigated. Both uninhibited and inhibited ethylene (as well as

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propylene) glycols have been aged at temperatures up to 190 °C for over 2000 h continuously to date. Aliquot samples of each glycol solution tested in this program were taken at 1000 and 2000 h of exposure for chemical analysis and pH measurement. Based on the data obtained so far, solution pH was found to decrease steadily with exposure time. The critical pitting potential of 1100 series aluminum in a 50 vol % aqueous ethylene glycol solution is reported as functions of both temperature and chloride ion concentration. This information is essential in the cathodic protection of pitting corrosion of aluminum. Graft copolymer networks of poly(acrylic acid) (PAA) containing well characterized tethers of high molecular weight poly(ethylene glycol) (PEG) were prepared using free radical solution UV-polymerization. This was carried out with acrylic acid (AA), monomethacrylate PEG with a molecular weight of 2000 and tetraethyleneglycol dimethacrylate as a crosslinking agent. The copolymers were prepared in different molar ratios. The high molecular weight PEG was incorporated to improve mucoadhesion through interpenetration and as a result improve residence time of the carrier and absorption at the drug delivery site. The dynamic swelling parameters were determined in buffer solutions containing NaCl at different pH. The mucoadhesive properties were tested by bringing the copolymer into contact with mucin solution and determining the work of adhesion through the use of an Instron tensile testing machine. Results suggest that these copolymers are exceptional protein delivery candidates due to their pH-sensitivity and controllable swelling behavior. However, the addition of PEG 2000 tethers has shown to

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deviate from the synergistic effect of the PAA hydrogen bonding and PEG interpenetration by decreasing the mucoadhesive properties of the hydrogel.

Propylene Glycol Solutions for Use as Solar Heat Transfer Fluids

I & EC

Poly(Ethylene Glycol) Chemistry

Nanomicelles with Tunable Lower Critical Solution Temperature Behavior

Study of corrosion and its control in aluminum solar collectors

The instrument has four collection vials that must be filled with ethylene glycol before operation. Each of the four vials should be labeled 1 through 4 and the empty weights recorded. Fill each vial with 80 mL of ethylene glycol and record the weight again. In order for the instrument to operate properly, the collection vials should always have less than 160 mL of total liquid in them. After completing a sample run, remove the collection vials, use a transfer pipette to remove any liquid that might still be on the air paddler, wipe off any condensation from the exterior of the collection vial and record weight. From the instrument, record the ending volume and the time of operation. The solution mixed in the scintillation vial will be 2 ml of a 95% to 50% ethylene glycol to water mixture. To determine the efficiency of counting at all of these concentrations, a series of vials should be set up that consist of 18 ml of Ultima Gold LLT cocktail mixed with standard, regular deionized water and ethylene glycol. The efficiency curve should be counted in the 'Low Level' count mode with the Luminescence Correction ON and the Color Quench Correction ON. Once the tSIE values are determined, chart the cpm against the tSIE numbers and find the best fit for the data. The resulting equation is to be used to converting tSIE values from the collection vials to efficiency. To determine the background cpm value of the ethylene glycol,

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count a 2 ml sample of ethylene glycol with 18 ml of Ultima Gold for 100 minutes. To determine the total activity of the sample, take two 2 ml aliquots of sample from the first vial and place in separate scintillation vials. Record the weight of each aliquot. Determine the percentage of total sample each aliquot represents by dividing the aliquot weight by the total solution weight from the vial. Also, determine the percentage of ethylene glycol in the sample by dividing the initial solution weight by the final solution weight and multiplying by 100. Add 18 ml of Ultima Gold to each vial and proceed to count for 100 minutes in a 'Low Level' count mode. Before performing a calculation on the dpm value of each aliquot, a subtraction should be made for the background count rate of the ethylene glycol. Based on the background cpm, multiply the background cpm value by the percentage of ethylene glycol in the collection vial. Once the background value is subtracted, calculate the dpm value of the sample based on the tSIE conversion to efficiency. This will produce a dpm value. To convert this to a total activity of the sample, divide the aliquot dpm value by the decimal percentage of total sample the aliquot represents. This gives the total activity of the sample solution. Take the average of both aliquots as a final result. To convert the total activity from the solution in vial one to activity in air, an empirical formula is used to convert activity/gram from vial one to total activity introduced into the system. After calculation the final result for the vial, divide the total by the mass of the sample in vial one. This gives dpm/g (labeled  $C_{\text{sub m}}$ ). To convert this to total dpm measured,  $C = (128.59 * C_{\text{sub m}} + 10.837)/V$  Where:  $C$  = Tritium concentration in air (dpm/m<sup>3</sup>)  $C_{\text{sub m}}$  = measured tritium concentration from vial 1 (dpm/g)  $V$  = Volume of air sampled through instrument (m<sup>3</sup>).  $C$  is the final value of tritium concentration in air. In this investigation heat transfer in the nucleate flow boiling of dilute aqueous binary mixtures was measured and experimental data were compared with available correlating methods developed for binary mixtures. The concentration range from pure water to 40 percent ethylene glycol solution was tested

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under these conditions. Eighteen different concentrations have been investigated. Liquids were boiled at atmospheric pressure on a rectangular flow channel. The experimental set up consists of a 9.5 mm circular heater placed on the lower wall of a 3 mm x 40 mm horizontal channel. The results indicate that increasing the concentration of ethylene-glycol in water deteriorates the heat transfer coefficients as compared to the case of pure water at the same wall superheat.

Guide for SDEC Set Up

Study of Aluminum Corrosion in Aluminum Solar Heat Collectors Using Aqueous Glycol Solution for Heat Transfer. Semiannual Technical Progress Report, July 30, 1979-January 31, 1980

Standard Electrode Potential of Silver-silver Bromide Electrode in Ethylene Glycol-water Solution

Corrosion of Materials by Ethylene Glycol-water

Journal of the Indian Chemical Society

As part of an investigation of the cooling characteristics of liquid-cooled engines, tests were conducted with an electrically heated single-tube heat exchanger to determine the heat-transfer characteristics of AN-E-2 ethylene glycol and other ethylene glycol-water mixtures for a range of conditions.

Aluminum alloys that are used in engine cooling systems with high velocity fluids are particularly susceptible to damage by cavitation. Electrochemical methods were used successfully to determine the contribution of corrosion to the total metal damage caused by ultrasonically-induced cavitation. Measurements were made for an aluminum casting alloy immersed in hot ethylene glycol solutions,

which were either well-inhibited or poorly inhibited against corrosion. Results of controlled-potential tests showed that the resistance of aluminum to cavitation damage in various media may be evaluated electrochemically, and that the magnitude of the effect of corrosion on cavitation damage can be as high as 75 percent of the total damage when cavitation is induced by ultrasonics. The metal potential, the corrosivity of the medium, and the inhibitor content of the ethylene glycol solution affect the nature and degree of cavitation damage.

Heat-transfer Tests of Aqueous Ethylene Glycol Solutions in an Electrically Heated Tube

Automotive Antifreezes

Industrial and Engineering Chemistry

Ultrastructural Changes In-vitro Matured Bovine Oocytes Cryopreserved in Ethylene Glycol Based Solution by Conventional Method

Synthesis and Solution Properties of Hydrophobically Associating Heptadecanamide Poly(ethylene Glycol) Copolymer

*This article presents the results of an investigation into the behavior of a clay soil contaminated with mono ethylene glycol (MEG) through a program of experimental tests. Soil specimens were prepared with water or different concentrations (10, 25 and 40 %) of MEG by the*

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*slurry method. One-dimensional consolidation and consolidated undrained (CU) triaxial tests were performed on the specimens. The results of the consolidation tests showed that the preconsolidation pressure is increased and the value of (slope of normal consolidation line) is decreased with an increase in the concentration of MEG. In addition, the results of the CU triaxial tests indicated that the friction angles (in term of total and effective stresses) are greater for the MEG solution than for water as pore fluid, and their values are increased with an increase in the concentration of the MEG solution. It was also shown that Roscoe surface exists for contaminated soil in  $q, p', v$  space, and its position in this space is dependent on the concentration of pore fluid.*

*Antifreeze Solutions in Home Fire Sprinkler Systems examines the usage of antifreeze solutions in residential sprinklers, and analyzes their effectiveness in controlling a fire condition and aiding in containment. The book also investigates the possibility of a large-scale ignition occurring from solutions of varying mixtures, and proposes the optimal ones for reducing flammability. Antifreeze Solutions in Home Fire Sprinkler Systems is designed for practitioners as a reference guide for handling antifreeze solutions in residential sprinkler systems. Researchers working in a related field will also find the book valuable.*

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*The Code of Federal Regulations of the United States of America  
Containing a Codification of Documents of General Applicability and  
Future Effect as of December 31, 1948, with Ancillaries and Index  
Proceedings of Annual Solar Heating and Cooling Research and  
Development Branch Contractors' Meeting  
Practical Druggist and Pharmaceutical Review of Reviews  
Standards*

The idea for this book came from discussions among participants in a symposium on biotechnical applications at the "Pacifichem 89" meeting in Honolulu. It was the majority opinion of this group that a volume dedicated to biotechnical and biomedical applications of PEG chemistry would enhance research and development in this area. Though the book was conceived at the Honolulu meeting, it is not a proceedings of this symposium. Several groups who did not participate in this meeting are represented in the book, and the book incorporates much work done after the meeting. The book does not include contributions in all related areas to which PEG chemistry has been applied. Several invited researchers declined to participate, and there is not enough space in this single volume to properly cover all submissions. Chapter I—an overview of the topic—discusses in brief applications not given detailed coverage in specifically devoted chapters. The following topics are covered: introduction to and fundamental properties of PEG and derivatives in Chapters 1-3; separations using aqueous polymer two-phase partitioning in Chapters 4-6; PEG-proteins as catalysts in biotechnical applications in

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Chapters 7 and 8; biomedical applications of PEG-proteins in Chapters 9-13; PEG modified surfaces for a variety of biomedical and biotechnical applications in Chapters 14-20; and synthesis of new PEG derivatives in Chapters 21 and 22.

Dechlorination of Polyvinyl Chloride in NaOH and NaOH/Ethylene Glycol Solution by Microwave Heating.

Air Force Civil Engineer

Ethylene and Propylene Glycols

Hyperbranched Fluoropolymer (HBFP)-poly(ethylene Glycol) (PEG) Amphiphilic Nanostructures in Solution and as Components of Crosslinked Networks

Analysis of Poly(ethylene Glycol) Tethered Poly(acrylic Acid) Networks for Mucoadhesive Applications

Solution Copolymerization of Methyl Methacrylate and Ethylene Glycol Dimethacrylate

**Solutions of ethylene glycol are being considered as heat-transfer media for radiators in manned space capsules. This report was prepared to summarize the available corrosion data on uninhibited and inhibited ethylene glycol solutions. Much of the corrosion data are based on automotive and diesel engine coolant systems. Several factors considered are: time dependence, effect of pH, concentration, temperature, aeration, chloride ion, velocity, heat-transfer rate, and galvanic couples. Inhibitors for which corrosion data are presented include: borax, sodium benzoate, sodium nitrite, triethanolamine, Sodium mercaptobenzothiazole, soluble oil, chromates, as well as miscellaneous inhibitors. A number of patented inhibitors based on borax are discussed. Descriptions of test procedures including automobile service tests are presented.**

### **Biotechnical and Biomedical Applications**

**Effect of Mono Ethylene Glycol Solution on Mechanical Behavior of a Clay Soil**

**Adsorption of Sodium Perchlorate from Ethylene Glycol at the Mercury - Solution Interface**

**Electrochemical Corrosion of an Aluminum Alloy in Cavitating Ethylene Glycol Solutions**

**An Evaluation of the Anticorrosion Effect of Ethylene Glycol for AA7075-T6 Alloy in 3.5% NaCl Solution**