American Institute of Chemical Engineers
Central Florida Section

Volume 15; Number 8 Clearwater- May/June Update

Newsletter Contents:

Clearwater Conference:

It is that time of year again!! Our 34^{th} Annual International Phosphate Fertilizer and Sulfuric Acid Technology Conference, also known as AIChE's Central Florida Clearwater Convention is just a few weeks away!

Make your conference registrations NOW!

May 15th is the end of early registration for the conference. Registration Prices will increase $20.00 after May 15th. While we will gladly take your extra money, it helps in making the conference arrangements if we have your registrations early. On-site registration prices will also be higher. **May 15th** is also the deadline to be included in the Annual Central Florida Section Membership Directory.

Register On-line now and Save a few dollars
http://www.acteva.com/booking.cfm?bevaid=197620

May 10th was the cutoff date to receive the AIChE Discounted Room price at the Sheraton Sand Key. Please note: the Hotel is already full.

If you have rooms reserved that you will not be using, please contact our treasurer Bruce Wiggins treasurer@aiche-cf.org before you release the rooms, as we have people looking for rooms. If you are looking for a room, Bruce Wiggins is maintaining a waiting list.

Rooms may also be available at the Marriott Suites across the street, or at other Clearwater Beach Hotels - Please see or web site for suggestions (Registration/ Reservation Tab).

Clearwater Sponsorship

We are still actively looking for directory and convention sponsors. What better way to advertise your company than a direct ad to all the chemical engineers at the Clearwater Convention?

There are five level of sponsorship available for the Clearwater Convention: Bronze ($100), Silver ($200), Gold ($300), Platinum (>$350), Double Platinum (>$500), and Triple Platinum (>$1000).

Sponsorship money is used for refreshments during the conference breaks and printing costs. Clearwater Proceeds are used to support the local AIChE Education programs, Scholarships and Teacher Grants.

If you are interested in being a sponsor, please contact Francine Neuman at vice-chair@aiche-cf.org / Work Phone (813)267 -4117. Also, easy online payment is available at our website.

Schedule

June 11th	**Friday: 13th Annual Sulfuric Acid Workshop 1-5 PM** **P.E. Laws and Rules-Continuing Education 1-5 PM** **Hospitality Suites 6 PM**
June 12th	**Saturday: Convention Panels 8 AM-12:30 PM**

We will be holding elections for our AIChE officers and board members.

If you are interested in becoming an officer or board member, contact Francine Neuman -- vice-chair@aiche-cf.org.

The positions are as follows:
Chair, Vice-Chair, Secretary, Treasurer, and (4) Board members.

We will send out a ballot via email shortly.

ATTENTION:

ALL AIChE CONFERENCE ATTENDEES' SPOUSES

SPONSORED BY:

AIChE CENTRAL FLORIDA CHAPTER

You are invited to a Continental breakfast
Saturday Morning June 12TH
9:30 to 11:30

Sand Key Room (lobby) – Meet old friends and make new ones!

FOR YOUR FAMILY'S SAFETY, PLEASE NO UNESCORTED CHILDREN

HOSTED BY:

ENGINEERS' WIVES CLUB OF POLK COUNTY

Spring Social Event

~ Sea World Luau ~

Thank you to those who were able to attend our Spring Social at Sea World. We hope that you had a great time!

A Group Photo is on the AIChE web site

Friday Sessions-Sulfuric Acid Workshop, P.E. Laws and Rules

Sulfuric Acid Workshop

Central Florida Section of the AIChE Clearwater Convention 2010 Workshop Information

Friday, June 11, 2010 1:00-5:00

Thirteenth Annual Sulfuric Acid Workshop

Design, Operation and Maintenance of Acid Towers in Sulfuric Acid Plants

This year the topic for the Workshop is the design, operation and maintenance of acid towers in sulfuric acid plants. The Sulfuric Acid Workshop was organized to establish informative discussions concerning the design, operation, and maintenance of sulfuric acid plants.

This year's sulfuric acid workshop will focus on the design, operation, and maintenance of acid towers. This crucial component is common to all sulfuric acid plants. The effective operation of these towers ensures trouble free operation of the downstream equipment such as, gas-to-gas heat exchangers and ductwork and low opacity in stack emissions. This workshop will explore past, current, and proposed designs for acid towers design.

The workshop format consists of presentations focused at practicing engineers with various degrees of exposure to the sulfuric acid process, plant operation, and plant maintenance. The topics to be discussed are presentations concerning acid brick specifications and installation, NOx exposure, maintenance of acid distributors and acid towers, and mist eliminators. The focus is to assist engineers evaluate the operation and maintenance of acid towers. It is necessary that engineers involved in plant operations understand the issues of this critical piece of equipment. The program will assist in specifying replacement units, evaluation of tower operation and evaluation of tower components for replacement proposals, and evaluating materials of construction. Following the presentations, a panel discussion will take place giving all participants the opportunity to have their questions answered by our panel of experts in the industry.

The Workshop is for people that are involved with the design, operation, and maintenance of sulfuric acid plants.

P. E. Laws and Rules - CONTINUING EDUCATION

CLEARWATER 2010

The Florida Administrative Code (FAC) section 61G15-22.001 requires that each professional engineer registered in Florida shall complete eight professional development hours during each license renewal biennium as a condition of license renewal. Four hours shall relate to Laws and Rules and four hours shall relate to the licensee's Area(s) of Practice.

The American Institute of Chemical Engineers—Central Florida Section, --will be offering sessions at the 2010 Clearwater meeting to satisfy both of these requirements. There will be no separate charge for these sessions and certification, but conference registration is required. To obtain certification, you must attend the full session of the section for which you need credit. You must also supply your P.E. number on or before Friday, June 11, 2010, and you must have your attendance verified by proctors.

AIChE Central Florida (A state approved Florida Laws and Rules Provider) is offering A 4-hour course on Florida PE Laws and Rules to be held on Friday, June 11, 2010, from 1:00 pm to 5:00 pm.

If you are attending **ONLY** the Florida Laws and Rules Seminar,
you may register online at Acteva Online Registration
or click here and Print out the registration form and return by mail

Participation in the Saturday morning technical sessions on June 12th, or the Sulfuric Workshop on June 11th, will satisfy the Areas of Practice requirements.

NOTE: We MUST have your correct Florida PE Number before the conference to issue PDH Credits!!!
We will issue a certificate which you may file with other states for credits. We Do Not report credits to any state outside Florida

Session 1 Abstracts

10.1.1 Predicting the Citrate Soluble Loss of the Dihydrate Process

Mohammad Abutayeh & Scott W. Campbell, Department of Chemical Engineering, University of South Florida

A thermodynamic model was developed to predict the limits of distribution of phosphates between the liquid and the solid phases in a reactor used for extracting phosphoric acid from phosphate rock by the dihydrate process. A computer code based on the model was generated to carry out different simulations of the process using several inputs of temperatures and liquid phase content of sulfates and phosphates.

Experimental data of equilibrium constants were regressed and included in the model obtaining a more accurate representation of the thermodynamic equilibrium. In addition, the Edwards-Maurer-Newman-Prausnitz Pitzer based model was incorporated into the model to write the activity coefficients of all species, while published lime solubility data was used to find an expression for the self interaction parameter of phosphoric acid. The model was validated by comparing its predictions to experimental citrate soluble loss data yielding very compatible results. Simulation results for ionic strength, solution acidity, lime solubility, and citrate soluble loss were used to analyze temperature plus solution sulfate and phosphate content effects on the dihydrate process.

Decreasing temperature and increasing sulfate levels was found to raise the acidity and the ionic strength of the solution as well as minimize the citrate soluble loss.

10.1.2 Multi-Stage Membrane Treatment Plant for Fertilizer Manufacturing Wastewater

Neil Beckingham & Charles Dyke, Hatch Ltd.

Traditional methods used to treat highly acidic process wastewater produced from the phosphate fertilizer manufacturing process, such as double liming, are expensive and can cause other waste management issues, such as sludge disposal. In 2004, Hatch partnered with Mosaic, one of the world's largest fertilizer manufacturers, to develop a cost effective and sustainable solution for treating phosphate plant spent liquor. The work involved extensive dialogue with Mosaic to ensure that the key issues and potential solutions were understood, researched, modeled effectively, laboratory tested, and extensively piloted. This work led to the development of the Spent Liquor Treatment Process (SLTP).

In 2008, Mosaic awarded Hatch a contract for a SLTP plant at Mosaic's Bartow, FL facility. The SLTP is a multi-stage membrane treatment process that produces an effluent that can be discharged into Florida Class III waters. The process removes high concentrations of fluoride, ammonia, and phosphate from the spent liquor, while reducing TDS from 35,000 to less than 250 mg/L. In addition, the fertilizer plant's environmental impact is reduced by reducing freshwater usage. Process economics compare favourably to traditional treatment methods.

Hatch performed the laboratory test work, pilot plant studies, engineering design, procurement, installation, and commissioning of the SLTP at Bartow, and has an evergreen plant operations and maintenance contract with Mosaic.

This project has been noteworthy for the following:

• The Bartow SLTP was constructed within budget and ahead of schedule, with no lost time incidents during the project - 90 safety audits were conducted during construction.
• Contaminants in the treated water from the full scale plant are well below design limits.
• SLTP concentrate streams are reused within the process itself.
• Hatch was recognized in 2009 as one of Mosaic top 10 vendors.

10.1.3 Cost Optimized Pumping in the Phosphate Industry

Eric Coffin, P.E, Green Engineering, Inc.

Pumping equipment and energy costs comprise a large portion of the money that is both invested and spent as operating costs in the phosphate industry. This paper offers a pro-forma cost-based computer model that optimizes up-front investment with on-going operational costs to yield a minimum life cycle cost for the owner. Purchasing the smallest pump and piping system during engineering design and construction makes the project manager a cost savings hero. Operating such a high pressure drop system over ten years results in high energy costs and frequent maintenance for the utility manager and front line mechanics. The owner is left to struggle with operating profitability and a stranded non-performing asset if forced to shut the doors. Learn how to quantify the investment, risk, and life cycle operating costs of pumping systems to optimize your company's capital costs and operating costs.

10.1.4 Phosphates in South America: A Review

Dr. Tino Prado & Megan Ross, Prado & Associates, Prado Technology Corp

The phosphate industry as we know it today started in the United States about one hundred years ago. Initially the industry started in places like Tennessee but then shifted to Florida where the main deposits were located. Currently additional mining activity also takes place in North Carolina and Idaho. Nevertheless, the reality is that during the past forty years phosphate rock mining and the associated production of phosphate fertilizers has shifted out of the United States to various countries in Africa where major deposits exist.

While the recent focus of attention has been in places like Africa, there has been a quiet expansion of production capacity in South America. Because rock deposits in South América are smaller than those in Africa, most production is for local or domestic consumption only. Nevertheless, two major mining projects are currently underway in Perú, of them sponsored by a Brazilian company. Phosphate rock production in South America is expected to increase dramatically over the next few years, and we likely expect that phosphoric acid capacity will also increase. The purpose of this technical paper is to provide an overview of the phosphate industry in the continent of South América and its future prospects.

10.1.5 The End of Days – A process for the reduction of cooling pond acidity employing series filtration of phosphogypsum and the elimination of water soluble P2O5 losses to the gypsum stack using the closed loop cooling water concept

Leif Bouffard, Central Engineering

As concerns over the financial liability associated with the final closure of a Phosphate Fertilizer Facility and the ultimate disposition of the cooling pond continues Central Engineering is evaluating the use of Series Filtration (Double Filtration) of Phospho-gypsum and the Closed Loop Cooling Water System as a more economical and rational approach to solving the problem. Commercially proven technologies were selected as a means of reducing the cooling ponds volume and acidity while eliminating the loss of water soluble P2O5 to the Gypsum Stack. The process provides for an improved recovery of Phosphoric Acid (water soluble P2O5) which directly results in a lower P2O5 concentration in the cooling pond water. Phosphoric Acid is usually the highest concentration of acidic component of the cooling water which must be neutralized prior to closure. The improved recovery of P2O5 also leads to improved recovery or harvesting of Sulfuric Acid and Ammonia as well. Employing the Closed Loop Cooling Water System provides a P2O5 free transport fluid for stacking of Phospho-gypsum which drastically reduces the loss of water soluble P2O5 to the gypsum stack. This combination ultimately leads to the elimination of the Cooling Pond and recovers the valuable constituents which make the cooling ponds a financial liability.

10.1.6 Capital Project Cost Estimation

Richard Harrison, Pegasus TSI

This paper describes the steps required to prepare a capital cost estimate for a project in the chemical processing industry.

Three different accuracies are usually prepared – the initial order of magnitude +/- 50% estimate, a second round +/- 30% estimate, and finally a +/- 10% estimate is completed.

Deliverables required to complete the estimate depend on the accuracy of the estimate, but can include the following:

- Process Description
- Process Flow Diagrams
- Feed & Product Stream Summary
- Equipment List
- P&IDs
- Instrument List
- Electrical One-line Diagram
- Piping Line Table
- Equipment Arrangement Drawings
- Pipe Route Drawings
- Demolition Drawings
- Material Take Offs
- Major Equipment Quotes
- Project Schedule
- Estimate Summary
- Itemized Estimate Detail Report

A few recent projects will be reviewed including a sulfuric acid plant converter replacement, a phosphoric acid digester addition, a phosphoric acid filter central valve replacement, a clarifier addition, an evaporator expansion, and an evaporator fluosilicic acid recovery retrofit.

10.1.7 Study for Disc Filter Cloths Debottlenecking & Flotation Plant Improvements

Dr. Martin Dionne, Hatch Ltd.

The extraction of minerals from earth requires ore beneficiation as a first stage of refinement. The primary concentrate can then undergo a second stage of refinement that requires regrinding to release the remaining gangue which is followed by a separation/flotation process to increase the concentrate grade. The higher grade Flotation Concentrate slurry needs to be dewatered by a filtering process/media. Maintaining the filtering rate and filter efficiency constant as a function of time can be challenging due to progressive filter cloth blinding that usually results in process upsets that impact the Plant OPEX as well as its capacity.

In the current studied case, the blinding was severe and occurred during a period of 7 to 10 days of operation where the filtering efficiency rate loss was averaging -1% per day with maximum/peak value at -3% per day; i.e., an average productivity loss of 10% and up to 30% over a production period of 10 days. This caused the disc filters to be the primary Plant bottleneck followed by the Flotation Plant; both being in the critical path for the Plant capacity increase program.

A study was initiated with the objectives of 1) understanding, identifying and solving the filter cloth blinding problem and 2) identifying the Flotation Plant bottlenecks and recommend solution for immediate improvements. The developed approach was based on an R&D project model that included: internal and external literature review, Process Performance Assessment to establish the base case process KPI's , historical and in-plant DOE for process parameters optimization, Flotation Plant Performance Audit, ARENA modeling, FACT-Sage for thermochemical calculations as well as advanced Microscopic Characterization techniques such as FEG-SEM coupled with x-ray EDS, Auger Microscopy, IFTR, XPS, and XRD.

Microscopic characterization enabled us to identify the cause of the filter cloths blinding and to propose practical solutions. Interestingly, a link was made with another problematic sector of the Plant where the screens were experiencing a similar blinding/clogging problem causing them to be this sector's bottleneck. Process Performance Assessment combined with Design of Experiment allowed us to recommend parameter changes/adjustments for optimal/improved filtering efficiency for a possible filtering rate capacity increase of 5 to 10 %. The Flotation Plant Audit allowed us to establish the current flotation circuit capacity and identify the bottlenecks for capacity increase while establishing a list of recommendations for process control improvements. Finally, literature review generated some spin-offs. New flotation reagents that have been identified and tested at the laboratory scale might lead to Flotation Plant improvements while lowering the cost of reagents by 30 to 50%.

10.1.8 Technology Development for the Fischer-Tropsch Synthesis: Efficient Conversion of Biomass to Liquid Hydrocarbons

Syed Ali Zeeshan Gardezi, Babu Joseph, and John T. Wolan, Dept of Chemical & Biomedical Engineering, University of South Florida

Fischer Tropsch Synthesis (FTS) is a process for converting syngas (a mixture of carbon monoxide and hydrogen) into clean liquid fuel. Originating in Germany in the 1920's, it is an alternate route for producing liquid fuel e.g. gasoline, diesel and aviation fuel. With the gradual rise in global energy requirements (60 % between 2002-2030 source: world energy handbook 2004) there is an urgent need for alternate renewable energy resources. Following the current energy trends and future predictions (expected fourfold rise in the use of biomass for transportation fuel source: world energy handbook 2004) we have designed a tunable catalyst for efficient conversion of synthesis gas produced from biomass into liquid fuels. An egg shell catalyst consisting of a silica support impregnated to a tailored depth with cobalt nanoparticles has been designed and synthesized in our laboratory for this purpose.

Egg shell catalyst design is an exceedingly innovative concept that overcomes mass transfer limitations inherent with conventional reactor catalyst systems. Production of long chain hydrocarbons in FT synthesis is rate limited due to the accessibility of active catalytic sites for diffusion of carbon monoxide. The tunable thickness of active catalytic surface area ensures that enough active sites are available for desired, highly selective hydrocarbon chain growth. In this way the required petroleum cut is obtained without any additional unit operations. Such a design has not been explored or exploited commercially as yet. Conventional reactors provide waxy product and additional unit operations are required to obtain the desired fractions. Additionally, the specific reactor design that we offer eliminates current heat transfer issues. FT synthesis is a highly exothermic process, if the evolved heat is not removed; catalytic sintering, decay and attrition are the net result. This problem has been a major stumbling block for commercial reactors and must be operated far below full capacity. We offer an innovative mixing an inert heat sink and catalyst along with inter-compartmentalization. Such a combination results in effective heat removal in the absence of an external cooling jacket.

Our eggshell catalyst is product specific; there is huge savings in operating cost because of less downstream equipments for product refining. Lab results indicate absence of aromatics and alcohols in the final product; a clean fuel will thus enhance engine performance. Almost all FTS reactors face the issue of downstream wax accumulations which is very difficult to resolve. With this technology, there is little to no chance of facing this issue, reducing the plant downtime due to reactor problems. The reactor design takes care of heat transfer issues, thus the reactor can be operated at optimal conditions giving higher conversion. Indications are that linear scaling up of this reactor will preserve the optimized bench-scale results.

At present, our initial target market is the Department of Defense (Air Force). The Air Force has a goal to obtain half of its fuel used in the continental US from renewable sources by the year 2016 (DOD Energy Security Task Force 2008). We intend to provide a clean, continuous, reliable and domestic supply of NATO JP-8 (Jet Propellant-8) grade, the highest of its kind, produced via biomass using our proprietary gasifier, catalyst and reactor designs. Liquid fuel is a strategic resource that has significant security, economic and geo-strategic implications. DOD's fuel consumption varies from year to year in response to changes in missions and the tempo of operations. In FY 2000, fuel costs represented 1.2% of the total DOD spending, but by FY 2008 fuel costs had risen to 3% (DESC Fact Books 2008). The Defense Energy Support Center (DESC), under the command of Defense Logistics Agency (DLA), has the mission of purchasing fuel for all DOD services and agencies, both in continental US and outside US. The Air Force and the Army represent the primary consumers of JP-8 fuel whereas the Navy consumes JP-5. The majority of DESC's bulk fuel purchases are for JP-8 jet fuel, which has ranged from 60 to 74 million barrels annually. A September 2009 report published by the Congressional Research Services indicated that in FY 2008 the DOD's purchases for JP-8 fuel totaled 62.5 million barrels at $3.13 per gallon (Congressional Research Service, Department of Defense Fuel Spending, Supply, Acquisition and Policy- Sept 2009). According to the same report, the DOD spent almost $18 billion on acquiring fuels in FY 2008. With the ongoing operations in Iraq and Afghanistan to support the ground operations, the DOD's demand for JP-8 jet fuel will continue to go up and will only put upward pressure on reaching the target of obtaining 50 % of its fuel supply from renewable sources by 2016.

Session 2 Abstracts

10.2.1 The Best Data Wins

Dan Freeman, Fenco

The production of sulphuric acid is generally a cost centre. The operation has no cash flow and must vie for maintenance resources in a crowded arena of other cost centers arguing strenuously for an equitable share to prevent "imminent failure". Typically acid plants suffer a slow failure process, which permits timely intervention. Anyone can distinguish abject failure of a component and plan its rehabilitation. Within the sulphuric acid plant, it is the tracking of detailed history, non-destructive testing and on-line performance that allows for meaningful prediction and resource allocation. This presentation will highlight some of data collection and collation methods that can be used.

10.2.2 PCS Phosphate's New 4500 STPD Sulfuric Acid Plant in Aurora, NC

Terry Baker of PCS Phosphates & Bob Fell of MECS

The largest sulfuric acid plant in North America was recently placed into operation for PCS Phosphate Company, Inc. in Aurora, NC. This 4500 STPD sulfur burning plant was designed and built by MECS, Inc. of St Louis, MO. The plant includes MECS Heat Recovery System (HRS) which recovers waste heat from the sulfuric acid process. The new plant recovers 95% of the heat generated and supplies approximately 700,000 pounds per hour of steam to the turbogenerator and fertilizer complex. Utilizing the steam recovered from the sulfuric acid process saves approximately 800,000 tons of carbon dioxide per year that would otherwise be emitted by burning coal at the plant site to generate the same level of steam. In addition, the plant is also designed to high environmental standards and the emissions for this plant are half of the current US EPA standard for SO2 emissions. This paper will cover the performance and features of the new plant such as ZeCor acid towers, large single compressor, cylindrical superheater and novel expansion joints.

10.2.3 Expanded Role for Dust Collection in the 21st Century

Thomas H. Kroeger, PE, Vice President, Kirk & Blum, a CECO Environmental Company

This paper will review and update traditional design parameters in industrial ventilation and process dust collection with integration of new NFPA regulations.
Points covered will be:

- Increased awareness of need for appropriate for in-plant hygiene
- Role played by dust collection systems
- Efficiency of traditional dust collection systems
- Benefits of considering process modifications to reduce dust collection requirements
- Impacts of NFPA regulations on system design
- Impacts of NFPA regulations on equipment selection
- Need for monitoring and maintenance
- Role of Makeup Air in complementing performance of dust collection system

Objective will be to raise awareness of participants of challenges, opportunities and options available to them in evaluating new and existing dust collection systems.

10.2.4 Reducing Emissions and Meeting Marketplace Needs - A Review of a Plant Modification

Rick Davis, P.E., Davis & Associates Consulting

This paper will examine how a sulphuric acid plant operator, implemented plant changes to react to changes in environmental regulation and the marketplace. The paper will examine how technical options were evaluated and a plan was developed to meet their corporate objectives and governmental requirements.

The plant was built as part of the World War II war effort to expand the country's production capacity of ammonium nitrate. Over the years the site has been transformed to meet a changing marketplace. The sulphuric acid plant originally supported the production of concentrated nitric acid, which is not required now. Currently, the plant produces acid for the regional merchant acid market.

The plant owner was faced with increasing environmental concerns to reduce the sulphur dioxide and acid mist emissions from their sulphuric acid plant. Davis & Associates Consulting, Inc. (DAC) was retained to review the possible routes to reduce emissions. The paper will provide an overview of the abatement options considered.

After extensive review, it was decided that the conversion to double absorption was the best option. DAC offered various double absorption options and two cost estimates were developed. DAC was given the go ahead to finish the engineering on August 15, 2007 with a targeted start-up date of June 30, 2008.

DAC worked with Penn Pro of Mulberry, Florida to perform the detailed engineering. With the tight project schedule the procurement of major equipment quickly became critical. The paper will review the project execution of this fast track project and how the owner and DAC put together an effective project team for the design, procurement, construction, and the successful commissioning of the plant.

10.2.5 Pumping Sulfuric Acid – A Challenge for the Durability of the Materials

Dr. Gerard Pracht, Friatec AG - Rheinhütte Pumps Division

Sulphuric acid is an important raw material in the chemical industry and represents a particularly aggressive medium for all materials. This is why some materials from the range of metallic alloys, plastics and ceramic materials are presented as materials for building pumps in the sulphuric acid medium (H2SO4). For this, attention should be directed particularly to the limits to use related to temperature and concentration. These limits to use are discussed here against the background of typical sulphuric acid media in the production of sulphuric acid and the application as desiccator acid. This is where the Friatec Rheinhütte Company's experience in chemical plant construction from over 100 years of pump building comes into play.

10.2.6 Different FRP Resin Chemistries for Different Chemical Environments

Don Kelley, Ashland Composite Polymers

The composition or chemistry of fiberglass-reinforced plastic (FRP) resins can be quite diverse resulting in FRP that is suitable for a given chemical environment or FRP that is not suitable. The chemical resistance of FRP is mostly dependent on the composition of the resin that is used to encapsulate the glass fibers and lock them into the desired shape. The purpose of this paper is to give an overview of resin chemistries that are used with FRP in various chemical environments and how these chemistries affect its performance.

10.2.7 Low Temperature SO2 Oxidation Catalyst

Dr. Girish Srinivias, TDA Research, Inc.

TDA is developing a Cs V2O5/SiO2 based catalyst for SO2 oxidation that contains a proprietary promoter that allows it to operate at temperatures as low as 340„aC when used in the 4th bed of the SO2 converter in a sulfuric acid plant. The presentation will illustrate the conversion possible with TDA¡¦s low temperature catalyst compared to a conventional SO2 oxidation catalyst. By using TDA¡¦s SO2 oxidation catalyst and operating at 340„aC, the maximum thermodynamic conversion limit is 99.89%. The study shows that we obtained 99.6% experimentally under 4th bed conditions, which is substantially higher than the 98.8% measured using a commercial catalyst at ~400„aC. No deactivation was observed over the course of 900 hours of laboratory testing (again 4th bed conditions) for two separate tests with the same catalyst.

With funding from the Department of Energy, TDA synthesized and tested a series of catalysts and compared their activities to several commercial catalysts. We are currently optimizing our catalyst formulation and making reaction rate and other kinetic measurements. We will scale up the catalyst and carry out bench scale demonstrations with the scaled up formulations.

10.2.8 Big, Small & Everything in Between - Design Considerations for Acid Plants

Dr. Hannes Storch, Outotec GmbH

Today acid producers request plant engineering companies of sulphur burning acid plants in a wide range from less than a 100 tpd up to 5000 tpd. These plants can be located in remote areas without sufficient infrastructure or in regions with extreme climatic conditions. All these parameters finally result in unique plant requirements, which are reflected in different design concepts of such plants (e.g. process and mechanical).
In this presentation two different concepts, a small sized skid mounted plant of 300 tpd and a Mega plant with 5000 tpd capacity will be described, design considerations explained and similarities or differences of these two plant concepts will be discussed.