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Chairman - General and Co-product Section
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Welcome delegates to the General and Co-product session, I am Dr. Santosh Kumar working as Scientific Officer at NSI Kanpur, and my colleague Dr. Deepali Nimbalkar who is at VSI Pune so let's begin the proceedings. The 1st paper is:-

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The 4th paper is **ISO 9001, 14001, 22000 & OHSAS-18001 certification at Haidergarh Chini Mills-by Yogesh Kumar Singh**

Yogesh Kumar Singh

Good evening everybody, let me give a brief introduction of Haidergarh Chini mill, this is a unit of Balrampur Chini mill, we are operating 11 sugar mills in eastern part of UP, and Haidergarh Chini mill is a world class cogen plant having 5000tcd capacity and 23.25 MW cogeneration, customers are general public, food processing units, state and central government etc. earlier work culture at HCM before ISO and all that was very organized and more than 32 foreign delegates mainly from USA Japan Australia Fiji Sudan etc have visited our plant so far, now the question is why we have taken ISO at Haidergarh, in order to announce the global look and to further improve upon the existing quality environmental food safety health and safety management system, we decided to go for this ISO system, HCM is the 1st such sugar complex in India to have been awarded certification of 4 standard in a single effort and we are 1st for the ISO 22000 which is related to food safety, and we are 1st in Asia to have this certificate.

Advantages achieved

Accreditation with the distinguished integrated management certification has become a formidable strength to show management maturity in the market with all interested parties, besides reputation and goodwill of the company in the market.

- It helped in achieving consistency in the quality of our products additionally their effects on environment, health and safety and food aspects.
- It helped us in reducing the customer complaints and making the process more customers friendly.

- It upgraded the process operations by providing a chance to audit and self analyze the existing systems in the light of quality, environment, food, safety and health thoroughly.
- It helped in improving analytical capabilities of concerned employees who were associated with various risk assessment studies.
- It improved the legal and regulatory compliance.
- It developed strong mechanism to overcome any eventuality by conducting mock drill for fire fighting and mock recall for sugar produces.
- It helped in creating a professional work culture among the employees.
- It helped in developing safe work environment, safe environment around plant site, safe product for customer and overall quality culture for employees. No doubt this would improve HCM image in local community and society at large.
- It will help in establishing foundation for future corporate social responsibility (CSR) initiatives.
- BSI's practice of carrying out half yearly audits, keep the organization on toes. The internal auditing system places the best skills of internal qualified person and system is thus strengthened after every external and internal audit.
- No doubt, it places employees in a very respectable position in their professional realm when they work for a company certified for integrated management system which includes 4 international standards.

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The 3rd paper is **Clean Development Mechanism (CDM) for Carbon Credit and Benefits in Sugar and Distillery Industries-** by- B.I. Pastel, Prajapati M.N., Patel Seljakumar J & Rotliwala Yogesh C.

Yogesh C Rotliwala

A very good afternoon to all of you, I am working as a assistant professor in Vidya Bharti degree engineering college, basically I am a chemical engineer, I am presenting this paper on behalf of Sayan sugar.

Due to rapid industrilisation and urbanistaion along with high rate of utilization of phosphoric fuels nowadays we are facing issues related to environment and energy. Global warming, climate change, ozone layer depletion, acid rain, are the products of such critical issues. To overcome such critical issues CDM can become one of the tool to attain sustainable developments specifically for sugar industries, also it can become the tool for the additional revenue generation for sugar industry, as we learned in the last 2 days, sugar industry has a lot of volatility, also government policies are not confirmed as far as bio mass concerned, policy regarding ethanol is concerned, as well fuel generation or energy generation from bio mass. Still policy are not confirmed so why not use this tool for additional revenue generation, as its fixed, no. of sugar industries are getting credits, additional revenue so why not move the sugar industry towards this tool. The content of the presentation will be basics of greenhouse effects; introduction to Kyoto protocol and CDM, CER i.e. certified emission reduction, scope of CER generation in sugar and distillery, bagasse co-generation emission base line, case study of revenue generations, steps to earn CER under CDM and conclusion.

Let us try to understand first of all what is meant by greenhouse effect, the total radiation coming out from the sun, out of that infra red radiation which cannot pass through green house gases, which reflects back to earth, and ultimately that it increased the temperature of the earth that is called global warming. It is mainly due to the presence of green house gases consisting of carbon dioxide, methane, nitrous oxide, hydro fluoro carbons, fluoro carbons, sulphur hexa chloridese tc.As per Kyoto protocol the developed nations will have to reduce the carbon emission at least 5.2% less than that in the year 1990 by end of 2012, and reduction of emission of green house gases is designated in terms of carbon credit,1 ton of CO2 equivalent i.e. equal to 1 CER. By cogeneration, biocomposting, RO, collection of carbon dioxide etc. a huge amount of revenue can be earned by way of carbon credits.

To conclude, the CDM can provide major opportunities for co generation projects for developing countries like India, there is tremendous potential for co generation but actual project implementation is hampered by lack of experience or resources, the fuel ethanol projects and bio gas energy projects in the distilleries also have great potential which have not yet been realized, the sugar and distillery industry should now take maximum advantage of CDM as a way to improve the commercial ability of the industry and also help promote sustainable development thank you.

The paper is open for discussion

Question- Dr. Santosh Kumar- my 1st question is, how much per year you are earning by carbon credit?

Answer- author- basically it's a review paper, we have got data we are just simply trying to spread awareness about the CDM.

B.H.Shrikant- see this is a very good paper to educate regarding the CDM,

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The 2nd paper is **Automation at Jay Mahesh- Approaching Europe- by- Arvind Kumar Mishra**

AK Mishra

Sugar component cost, this is 100% at jay Mahesh sugar industries Ltd. We reduced it by 1.5% that reduction made in the energy that from that reduction made in the energy that from 3.4% it comes to near about 2.4% and other costs of .6% reduced to .4%.

Automation system, we distributed it in 4 parts, automation system, VFD for mills pump, mechanical circulators, pans, blowers, conveyors etc., heating system control, body vapor pressure control, massecuite level, massecuite level FFE, falling film level, all tanks levels controls and seed feed controls combined liquid measurement, other process parameter controlling, online brix measurement is there, sensing of all the process variables, energy monitoring of complete plant, then automation control system, DCS like control system is there we are controlling from controller and with IOS redundant control system for the critical equipment section, remote IOS based system for the non critical equipment section,

SCADA based interface is on the monitor, server clients interface, central synchronization server web server remote controlling, important panels are there, individual panels, VFD panels, automation panel details, all important and critical process parameters are there on the panels, opening status of each and every control valves, blinkers and hooters of all the critical valves are there, details of all the values with formulation which does not direct anything that will come from formula, steam consumption reduced side by side, power consumption reduced to achieve the following, steam consumption reduced to 30% on cane, power consumption total is reduced to 25.11 KW/tch cane in which cane preparation consumed 7.91KW/tch, mill consumed 3.75KW/tch, boiler 2.45, boiling house consumed 10.0 KW/tch for colony 1 tch.

Fuel saving by automation, VFD saved 10% of the energy, i.e. KW due to control valves logic with controlling instruments, that saved 3% steam, cooling and condensing system, automation on cooling and condensing that saved 1% power i.e. 40KW. Controlling of the of the pumps with sensor logic saved 80 KW, total power saved by automation is 13% 520 KW, that comes to 3.69% and steam saved is 3% on cane, composite bagasse saving comes to 3.4% composite. Total saving by automation, composite bagasse saving was 3.4% that comes to near about Rs 35/tch, quality improvement due to improvement in color, and coefficient of variation that comes to near about 14% against 20% due to reduction in retention time with the increases in the no. of compartments, man power saved was 15% that was 75 numbers reduced, total saving comes to about 2.2 crores on investment of 5 crores.

Saving by other economic devices, we are having other economic devices also, spray continuous pan i.e. a vertical pan, that saves about 12% of the steam, about 6% of the bagasse falling film and direct contact heaters that saves steam up to direct contact heaters that save steam up to 3% with the flash system also, planetary drive saves 2% of the power i.e. progressive cavity pumps saves near about 2% of the power, arrow belt conveyors saves 2%, cooling and condensing saves 2%, DC drives on centrifugal machines saves 3%, vaporizer and sulphur burners saves 1% of the steam that both composites comes to near about 9.584% and with the automation it comes to near about 33% of the bagasse saving. Bagasse saved 30%, power saved by automation is 30% of the total, steam saved by automation is 3% by other economic devices its 11%, and steam saved near about 16%, composite total bagasse saving is 13%. Thank you.

The paper is open for discussion

Question- Yogesh Singh- I must congratulate the author for running a highly efficient factory and as he mentioned that steam % cane is only 30% do you measure it through a flow meter or this calculation.

Answer- author- the whole factory is automated, even the falling massecuite is not picked up by the bucket that is where we introduced the hot water then it goes into the pit then by pump it goes to the other tanks. Yes flow meter is there.

Question- Mr. Sharma-very good achievement by your factory and I would like to visit your factory is that possible.

B.H.Shrikant- this is a very good paper, if considerable power saving is there it needs to be applauded, it's the necessity of the country, now one practical problem you have to bear in mind, sugar factory is full of sugar dust, that dust in suspension that dust enters these delicate automation instruments and the sugar dust being hygroscopic it absorbs moisture, and this will create some problems in the critical components of the automation system. This is one practical problem that you have to bear in mind otherwise this is very good and necessary, just to reduce the man power , now labor cost is considerably higher, just to reduce the labor cost this is necessary.

Author- our target for steam consumption is 14% even margin is there 25 .11 kw/hr it means steam consumption should come near about 22%, even margin is there 8% margin is from the electrical side also. For the sugar dust you have to introduce remedy for that, in Europe you cannot run a sugar factory or refinery or any factory without automation, so if in Europe it's running then why not in India?

Chairman- welcome delegates to the 2nd day's session we shall start with paper no.6

4

Invention of Acetylation Method for Measurement of Fuel Ethanol Percent in Fermented Liquid- by Dr. Anil Kumar Gupta

Dr. Anil Kumar Gupta

I am a reader at Dept. of Chemistry DAV college, this presentation deals with more accurate and shorter method for ethanol % measurement for the fermented liquid with the help of acetic and hydride and NaOH hydrochloric acid and phenolphthalein, 2 samples of fermented liquid were prepared laboratory and 1 sample of grape wine was taken for the measurement of ethanol% by this method.

10ml of water was taken in conical flask A, we have taken 4 conical flasks for this experiment, firstly 10ml of water was taken for blank reading, 10ml of commercial grape wine was taken in glass B for testing the accuracy of the Acetylation method used, 10ml of wash prepared from deteriorated sugar in presence of nutrients like urea and di sodium hydrogen phosphate was taken in flask C and 10ml of wash prepared from deteriorated sugar by adding one more nutrient, hydrated iron oxide in presence of previously used nutrients was taken in flask D.

Preparation of fermented liquid of deteriorated sugar, 14%(w/v) of deteriorated sugar solution in water was supplemented with .05% urea, .01%di-sodium hydrogen phosphate and .05% hydrated iron oxide. This solution was sterilized at 15psig for 15 minutes and cooled at room temperature. Addition of 0.05% active dry yeast was done in the solution and contents were fermented for 72 hours at 30°C.

2ml of acetic anhydride and 50 c.c. of 1 normal NaOH were added in each flask and excess of NaOH was titrated against N/2 hydrochloric acid using phenolphthalein as indicator till a pink color. This is the reaction, here water was used for the complete hydrolysis of acetic and hydride and we have got 2 molecules of acetic acid, but in flask B, C and D alcohol was there so acetic acid produced was lesser. So since we have used 50ml of NaOH this is excess

of NaOH in 1st reaction the requirement of NaOH for the neutralization of acetic acid was more but in 2nd reaction NaOH was required in lesser amount for the neutralization of acetic acid. Now here is the main point that in 1st case NaOH was required in excess amount therefore the less NaOH which was used for the neutralization of hydrochloric acid was also less so the need of hydrochloric acid is less in 1st case but in 2nd case since alcohol is present in flask B, C and D therefore less NaOH was consumed by acetic acid therefore you can also say that more of the hydrochloric acid was used to consume less NaOH. So the difference between the readings of HCL consumed by flask B, C, D and flask A is the actual amount of ethanol. This is the method which will give you more accurate reading value of ethanol. By the table also it is clear when we have taken in flask A water, then you have seen that 4.6 is the value blank reading and in 2nd case when we have taken wine which contains 7.8% alcohol when we treated and did the experiment, the value of hydrochloric N/2 HCL used was 38.6 and when we deducted 4.6 then we have got 34cc of hydrochloric acid consumed and since this was N/ 2 HCL so when we say that its N HCL we say that its value is 70cc, in 3rd case it is clear that 12.6 is the value of N.2 HCL and for N HCL it is 6.3 and in case of flask D it is 7.4. So % of alcohol in flask B 7.8, in flask C 2.8 and in flask D 3.4 so difference in flask C and flask D is .6 or you can say 6mm/100ml and 60gm/ton. And if you convert it in liters then it is 47 liters/ton of deteriorated sugar. This is the calculation and in the previous table whatever readings that are written is due to this calculation.

It is seen that Acetylation method is shorter and has an edge over other lengthy methods for measurement of ethanol % from fermented liquid in laboratory.

The paper is open for discussions

Question- how much is the total yield that I want to know.

Answer- author- that I told you, that was 47 liters/ton, means if we take 1 ton of deteriorated sugar and we add that hydrated iron oxide then we get this increase in the yield.

Question- B.H. Shrikant- this is good effort that you have made, just I would like to observe, grape wine contains nearly 7.8% ethanol, for statutory requirement 13% alcohol content is there.

Chairman- I have also got 1 question, you were saying that wine contains 7.8% alcohol then 2.8 then 3.4. How did you verify that these results are accurate?

Answer- I am just saying because I have taken this bottle where it was written 48% when there I am getting the result approx. 48% then I can say that my work is OK.

5

The 5th paper is **Concept of Sugar Corporate Policies and Strategy in present Scenario-** by Dr. Rajeev Kumar Sharma

Dr. Sharma

Thank you very much sir, as the time is limited I will just give the brief of the paper, now a day's sugar industry is becoming more and more competitive, corporate policy and strategy in present scenario is the subject of this paper, which is definitely of very much importance from the point of view of competitiveness, in the sugar industry or sugar market.

The development of concept of strategic management has taken become important for the last 2 decades.

This is fig.1 which shows what policies we have in certain organizations, these policies actually have certain different levels, policies are not only governed by the highest management of an organization, there are secondary policies also, major policy of any organization actually guides what should be the line of business of that organization, and the secondary policies, these are the selection of geography areas, major customers, major producers also and then the products.

Functional policies include marketing, production, finance, procurement etc. procedure and standard operating plants these are the handling process, middle order management and the lower management is concerned with these types of operating plants, and there certain rules in these policies, delivery of pay checks, loitering around plant, security guard duty, use of company car, smoking, etc. these guidelines fulfils the purpose of business whenever we deviate from this the purpose is hindered to be achieved.

Strategy adopted for reviving sick organizations are referred to as turnaround strategies, turn around strategies may be classified as 2 types, entrepreneurial and efficiency, the former type involves product or market reprocessing and effort to increase market share, product or market realignment maybe accomplished through new products, enhance R&D and improve product quality.

What about the 2nd type? Efficiency oriented turnarounds are characterized by lowering of operating cost through reduction of direct production cost and increase in employee productivity and reduction of assets, A. comparison of operating and strategic decisions, how operating decisions are taking, whether they are effective or ineffective and the strategic decisions whether they are clear or unclear. You see this table, here it's given in a very simple way, in column 2nd, unclear strategy but effective operations have contributed to success in the past but success in the future is doubtful, because of this unclear strategy, and 3rd its clear strategy but ineffective operations, have sometimes worked in the past in the short run but increasing competition makes success doubtful in the future, and 4th unclear strategy and ineffective operations need not to say they have proved themselves failure in the past and will be so in the future, but in the 1st.

Only clear strategy from the side of highest management and the effective operation from the side of lower and middle management cadre, this have contributed to success in the past, and will contribute to success in the future.

In Fig.2 Here is given the strategic decision making process, for simplification, when we install any organization we determine the mission, and purposes of the business or the corporate.

We have discussed in this paper a theory which I have not repeated, concept of strategy and this is concluded that how its related with its various other components. Strategy is an all encompassing plan of organization, in which its long range objectives are written down and the roots through which these objectives would be achieved are specified. Strategy includes all those actions which an organization intends to take in order to bring it to the position where it wants both be, there can be different type of strategies, growth strategy gives direction in which the organization wants to go for further growth, dependence reduction strategy aims to expand the area of independence for the organization thus making it more self reliant, independence means, independent from the pressure of even outside forces, suppliers, consumers etc.. I do hope that the corporate and the single organizations even behaving as corporate can be benefitted thank you very much.

Paper is open for discussion

Chairman- Okay, thank you so, for the remaining papers we will assemble at 9 AM sharp in the morning thank you.

6

The 7th paper is **Use of different Agrowastes as filler Material for Biocomposting with Distillery Spentwash-** by Deepali Nimbalkar, madhuri Gaikwad, H.D. Varalaxmi and V.S. Ghole

Dr. Deepali Nimbalkar

Good morning everyone since I am chairing the responsibility with the chairman here I have to stick to the deadline, everybody who has a distillery or who is working with a distillery is aware of the central pollution control board norms, which we know as the CREP norms, and we have to achieve zero effluent discharge, now most of the distilleries which are attached to the sugar factories, they generally try to use composting as final treatment method because it's the most economically feasible option for the treatment for the final treatment method.

It is also compulsory for distilleries attached to sugar factories to adopt bio methaynation as a primary treatment if they are to adopt bio composting, for this we require in the ratio of 1:2.5, i.e. for 2.5m³ of spentwash that has to be disposed, 1 metric ton of pressmud is required, and in general if we look at the mass balance there is a shortage of pressmud a lot of times, so it creates problems when the distilleries are expanding because when we go for environmental clearance the MOEF always asks for a material balance, and alcohol industry is very important, it adds revenue to your sugar factory so to balance all this its necessary to look for alternatives or supplementary filler material. Another short background for this project is that this project was sponsored by the central pollution control board, because they are also aware of the various problems which are faced by the distilleries.

Biocomposting is very economical in comparison to incineration so therefore its very necessary to look for alternatives for filler material. Now we are primarily an agricultural country, , what we did was, use of agro waste as filler material in various proportions, the control for this experiment was 100% pressmud,

The 1st experiment was composting of rice straw, and what we recorded on a daily basis was temperature and other parameters like carbon, nitrogen, phosphorous, potassium etc were carried out after every 10 days, we could see that it was initially in a thermophilic phase most of it was on the mesophilic phase of the composting. The final compost analysis showed that of course when we use pressmud as a control the 25% rice straw when used in combination with 75% pressmud showed a better quality of pressmud as compared to the other combinations,

We also did the same experiment with sugarcane trash, these are the temperature profile of the various experiments, when we go to the final compost analysis, the same picture is repeated here, that spentwash consumption increases as the agro based % is increased, and the 25% cane trash also shows the best results, for composting of wheat straw again the temperature profile showing a initial thermophilic phase which comes down and gradually starts flowing lowering down towards the end of the composting cycle. Final compost analysis we also did a microbial count in this and the microbial count for all the 5 treatments was good, here again the CN ratio for 25% wheat straw sugarcane trash was slightly lower, but 25% shows that its very close to the control.

My conclusion from the study was, it is possible to use these various agro waste like sugarcane trash, wheat straw, coir pith I wouldn't say as an alternate filler material because they cannot be used on their own, but as a filler material to pressmud because even if you replace 25% or supplement 25% extra from these agro waste then it would solve a problem of a lot of distilleries, the % of agro waste as I said should be 25%only this combination is suitable and the reason why this combination is suitable is because the agro waste by themselves have a very high CN ratio which is very difficult to compost in the 45 day cycle of course if we go in for a larger cycle maybe 90 days or say but again that kind of a cycle would not be economically feasible for the distillery, because here we have to achieve 2 things, we have to achieve the disposal of spentwash also in the norms and this would also recycle back these agro waste to the field, the spentwash consumption, which I have given in all these slides, is much higher and because of the small size of the compost heap but when we scaled to a larger level and based on these results the study which I conducted and presented at SISSTA when we scaled this up to a field level the consumption of spentwash was much lower in the range of 2.5 also so the leachate quality would also improve so all in all the use of such agro waste would reduce the problem of pressmud shortage and help the distilleries in solving the problem of spentwash disposal as per zero discharge now. Thank you

The paper is open for discussion

General observation, this is really a good piece of work, what I am looking forward is, this is central pollution board sponsored project so your results or conclusions should be given to central pollution board, will it lead to a situation where we would definitely like to work along with you on that, this can be a modification, nowadays they are insisting on soft boiler etc they are encouraging the bio composting so by this addition of 25% or whatever that will definitely increase the absorption of spentwash under the pressmud, so if this can be made official intimation to the distilleries many distilleries would try this.

Answer- author- sir, actually I have submitted my report to them in November 2008 and usually they don't allow publishing the results.

B.H. Shrikant- a very good that author has made, because 7-8 years back we were facing problem of this shortfall of the pressmud to match with the quantity, now this is good effort that various other raw materials have developed. As far as Krishna this point whether we can use the municipal solid waste, it's not possible because generally municipal sewage liquid waste and municipal solid waste these are situated in the cities whereas sugar factories attached to the distillery is based in the village, just to bear the transfer cost of this doesn't make it economically feasible.

Author- one small comment that I would like to make here is, as I have said that I have done these studies on concentrated spentwash and raw spentwash also but I did not publish the results because when I got permission from CPCB, it was exclusively felt that my publishing's should not contradict with the stand of CPCB anywhere.

Dr. Agarwal- I don't have any question, I have a simple suggestions for what she has done, see the pressmud physical properties and that of the other waste that she has tried are slightly different, pressmud granular small particles and these are large particles that is why biocomposting of these takes more time, my suggestion is that to get similar results if we can crush them powder them that will be better.

Author- that has been done with different particle sizes

7

The 9th paper is **Treatment of Distillery Effluent by Charged Air-** by Vandana Patil and Dr Vikram Ghole

Dr Vikram Ghole

Attempt to evaluate the charged air, for the treatment of distillery effluent i.e. in-house construction oxidizer unit, to generate charged air basically, the idea of charged air is that you are passing out air, dry and wet through very high voltage electrodes used to reduce the organic matter COD, BOD and color of the distillery effluent, the distillery effluent as such or pretreated using an up-flow anaerobic sludge blanket reactor was subjected to the oxidizing unit.

Then it followed degradation of the organic matter and oxidation of chromospheres, this is basically melanoidine and other compounds, chromospheres from the distillery effluent. This is a sort of schematic diagram of the charged air, from 1 point air is entering and there charged high voltage electrodes and once you get a charged air passed through the bubble through a sample and studies were made at laboratory scale, working at the oxidizing unit, the atmospheric air was converted into oxidizing air by passing it through a 2 tungsten electrodes, high voltage alternating current almost 5000 volt was applied then discharge gap

when electrode was 8mm, the experiments were conducted at room temperature, the discharged air into the effluent sample.

2 methods basically used dry air and wet air, bubbled through the distilled water and 2 modes single modes, single port and double port were used, oxidation treatment distillery effluent the charged air was bubbled through the reaction vessel containing distillery effluent, contact and mixing of the charged air with the effluent water was enhanced by use of study and sampling of effluent during oxidation at interval at 10 minutes was taken and parameters tested were pH, color, BOD and COD were estimated, you can see the particular change in pH as the time passes, the pH is decreasing that means something is happening, some acidic compounds are being generated because of this treatment this definitely we can see. Upper line indicates that the raw material and the 2nd one is the anaerobically digested material was used.

After treatment with UASB, 85% reduction was there and after oxidation with respect to raw effluent the no. is 44% reduction was there, if you just follow the same line the humid air just slightly increased in the reduction and if you compare the total reduction as such the oxidation after the USB treatment with dry air we got 93% reduction, in COD and humid air 94%, and the BOD reduction was 66% and 67%. Then reduction in color, single port and double port were compared, when you have a dark color basically beyond estimation of optical instrument so UASB treated reduced 27%.

So the conclusion was very simple, the charged air exhibits a promising potential for treatment of distillery effluent in terms of reducing COD, BOD and color, thus charged air oxidation process when used in conjunction with the UASB treatment process was particularly found to be very effective, mean of treatment of distillery effluent, such system can also have a treatment potential for other industrial effluents also. Thank you very much

Paper is open for discussions

Question- you mentioned that doing oxidation, some acids are generated; when acids are generated you have an additional acid that will produce bio-gas, have you measured what kind of acid is produced.

Answer- author- this is a treatment given after giving UASB treatment, so bio gas already has been generated, I am just saying that Ph is decreasing indicating that some acid is being generated means reaction is happening so oxidation system is working, it's just an indication.

Question- B.H. Shrikant- since this is in experimental stage, I cannot expect economics from you, but since you are going to emulate this experiment on industry scale, my humble suggestion is there, because if there is generation or sparging that requires power, again ozone is more powerful agent than oxygen but ozone production is very costly affair, that's why you just work out the cost of the power which is required to generate air from this aeration.

Answer- author- yes definitely. It's a good suggestion and we will take it into account

Chairman-I agree with you Mr. Shrikant the power requirement maybe high but we must look for future, to develop a technology for future whether its ozone or charged oxygen, this is the need of the time, at present it may be costly but in future we don't know we may be forced to use ozone only. For our survival we cannot compromise with the cost.

Question-I have 1 suggestion, you have got around 30%reducvtion in color after this, have you tried 2nd stage 3rd stage treatment also of the same so that can we eliminate color by subsequent oxidation.

Author- yes sir, actually we are going to try the 1st oxidation unit followed by UASB, basically we are interpreting that structure will be open the rings of melanoidine if you open by oxidation then bio degradation will be much faster, and there will be more color reduction, the experiments are going on right now.

8

The 8th paper is **Carbon Credits- Green theme for Sugar Industry - by Dinesh B. uphade & Prof. S.R. Patil** (authors not present)

9

The 10th paper is **Potential for Growing Bio-Energy Crop in Uttar Pradesh- by S.C. Reddy & Dr. G.S.C Rao**

S.C. Reddy

Good morning chairman, co-chairman and the delegates India as you know imports lot of crude petroleum and of this we incur about 131000 crores annually and if the general perception is that we cannot generate ethanol from molasses or sugarcane juice because the sugarcane production itself is low. in UP About 20.5 lakh hectares is under cane and in UP the yield is low.

In UP most of the industry is located in areas where water is plenty, so if you use those resources properly I think UP can became the sugar bowl of India, its already 2nd in the production of sugar but I feel that it has got a lot of potential to improve the yields.

Since sugarcane generates the highest energy and the entire bio mass is through carbon dioxide with hydrogen and through C4 photosynthetic activity the carbon is fixed so there is not going to be pollution in the country. There are the states which are advocating the use of ethanol and now I think the government of India has also gone up to 5% doping with the ethanol in the petrol but, I think there are some problem and the prices are not that favorable for doping petrol, the requirement of ethanol in future at 5% and 10% which can be met by the resent capacity of distilleries but non availability of raw material is the main hitch, and that can be utilized if we harness the potential of cultivation in cane.

But the productivity of cane in UP is half of Tamilnadu i.e. only 50 which we can easily raise up to 70. The deficiency of sugar cane is mainly due to the diversion of land for other crops.

There are 3 regions in UP which we identify as western, central and eastern UP. In western UP Muzaffarnagar and surrounding areas they produce almost 70 tons/hectare and the productivity of east and central UP is low even up to 40-45 tons, this is mainly due to unfavorable practices of what we call as archaic farming methods which cause the low or poor productivity and whatever is produced 45 to 50% in times of low production, the sugarcane is diverted to kolhus and khandsaris and as we know that they are also very poor and inefficient producers of sugar and we lose lot of sugar in the bagasse expelled from these inefficient mills.

Now the potential that we have is about 300 to 400 million qtls or 30 to 40 lakh tons which we can utilize either for sugar production or take the juice to produce alcohol, ethanol or any other, the reasons for low yield are poor management, depletion of nutrients from because of constant farming, excessive dependence on monsoon then practice of multi rationing, if the industry can improve on the sugarcane yield I don't think there will be any shortage of raw material for the sugar industry and indirectly for the ethanol production, and the focus should be to reduce the dependence on the alternate sugar produced by farmer and this is just a figure, you can see the total productivity to what % and the difference available so you have enough molasses and sugar production to meet the requirement of the country, thank you.

The paper is open for discussions

Dr. Rao- Just to sum up, see the problems are there and the problems will be there, if problems are not there perhaps we won't require to discuss it, the idea is to work out a strategy, this paper is hybrid whether it should go to agriculture section or the by-products, anyway the point is that there are several issues related to the industry that doesn't come under the structured 3 to 4 session we have, perhaps we will have to have a broader view, of economy managerial issues which are related to such things, the point is farmers income has to go up and unless it goes up we will not have ethanol we will not have bagasse, or co-generation we will not have sugar anyway. Sugar we can import raw sugar but we can't import power definitely so this is a necessity which is less discussed, less debated less worried, leaving it to the god or government or politicians doesn't lead us anywhere, the point is we have to aggressively talk about these things and we have to deliberate at different places, that is the purpose of this paper, it doesn't give anything new everybody knows, but only thing is the thought process has to start now thank you.

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Can India go the Brazil way by- Prof Satinder Kaur & Dr. R.S.S. Kaler

Prof Satinder Kaur

Good afternoon to all of you, I am from the dept. of sugar and alcohol technology, Gurunanak dev university Amritsar. USA is producing about 44% of the total ethanol from the corn itself, and sugar cane is used in Brazil,

We are the no. 2 growers after Brazil, and it's the countries 2nd most important agro processing industry after textile. But the sugar prices have fallen because about 2 years back we had a huge glut of production, even countries like Brazil, Thailand they are also doing well so there was a huge glut of production, and in fact this is a cycle every 4 to 6 years there is a bumper crop then there is a shortfall so there is no proper management that is one of the biggest problems, now when we had a glut mills suffered losses delayed payments disincentives.

I will show later on how Brazil plans the sugar production. Now today we are producing about 2.7 billion liters of ethanol that is the only amount, ethanol we know is produced from fermentation of sugars like corn, sugarcane, grains and wheat and in India ethanol comes mainly from molasses because out of the total sugar production 45 to 50% is molasses. It is eco-friendly, it has high oxygen content of 35% so we can go up to 19% blending, without any change in the engine.

Now why still it's not possible, 10% blending this year we don't have the cane, we have the infrastructure constraints, there is a lack of transparency and mutually agreed upon pricing of ethanol, oil marketing companies are facing unattractive ethanol prices, due to high state levels, states like Tamilnadu and West Bengal are putting in high state levels, they want the ethanol to be diverted towards potable so that they can get good levies and excise duties over that.

If you will see the story of Brazil, you will find that the 1st oil shock they got in 1973 when there was a war in the middle east between Egypt and Israel and the oil prices quadrupled, now Brazil imported 80% of its fuel and its economy went into recession because 40% of its foreign exchange was used in importing oil.

Brazil aims at developing export by 2010 mainly to Japan and Sweden, both have started blending up to 3% so this they are importing from Brazil. Brazil's sugarcane production if you see the chart it is today 422.8 million tons, sugar production is 28.7 million tons, now they have within the same mill complex the facilities for ethanol and sugarcane production, and depending upon the amount of sugar that they want they divert the rest of the sugarcane directly to the ethanol.

What are the solutions to our industry, 1st and the foremost is just as Mr. Bhagat said the other day that there should be no policy for sugar mills it should be totally decontrolled and the farmers should be free to give sugar cane whether for sugar or alcohol production. In this manner, the farmers will also be encouraged to increase the yield of sugar cane to a good extent.

The paper is open for discussion

Mr. Shrikant- this is not a question, this is for information of author and audience, see this US\$/MWH is not possible its KWH please rectify this, then basically we cannot compare Brazil with India, Indian political conditions are entirely different from Brazil, in Brazil thousands of acres are mechanized, there sugarcane cultivation cost/ton is so less, we have got much more because they have got large mechanization, the cost of cultivation there is

much less because they are able to sell the sugarcane for either sugar or ethanol at only 550 to 650/ton of sugarcane at this low cost they can afford to sell whereas in India specially in Maharashtra its gone up to 1600/ton, so at that higher price of sugarcane ethanol is not economically feasible. In Brazil the economic situation right from sugarcane to alcohol, sugar and ethanol are either for its own consumption or export is so well set that (the voice of the speaker keeps fading)

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**Scenario of Cost Production of Sugar of Co-operative Sugar Factories in Maharashtra-
by Seema Joshi, M.R.Marke, J.N. Mohanty**

Seema Joshi

India is the largest consumer and producer of sugar, it contributes 2% of total world sugar exports, and there are 650 installed sugar mills over 20 states of the country, of which 317 are in cooperative sector. During the season 2007-08, 516 sugar mills were in operation, and produced 267.53 lakh tons of sugar. This table will give you the progress of co-operative sugar factories in India. During 2000 - 01, only 135 sugar factories were there and now 2007-08, there are 516 sugar mills total out of which 249 are co-operative and produces total 26.55 million tons of sugar.

This is the Maharashtra sugar scenario, Maharashtra is the largest sugar producing state, contributing nearly about 35 to 40% of countries sugar production, out of 192 installed sugar factories there are 165 in co-operative sector and 27 in private sector, during 2007-08, 175 sugar mills were in operation and produced 90.74 lakh tons of sugar, now during 2008-09 season, 145 sugar mills were in operation and produced 45.78 lakh tons of sugar with recovery % of 11.37%, this is the scenario of sugar factories in Maharashtra, during 2007-08, 173 mills were in operation and sugar production was 90.70 lakh tons, 11.94% of recovery.

Now I will talk on cost of production of sugar factories, India's cost of production, is very high, primarily due to high farm cost, mainly because of high cost of production of sugarcane,. Low productivity, small farm size, low sugar content etc. cost of production in India is higher than major exporters like Brazil and Australia, and India is producing cheaper sugar than countries like Thailand and China. This is recovery % of various countries, lowest recovery of India than other countries, cost of production mainly consists of cost of cane and processing cost Processing cost includes cost of conversion and depreciation and interest, this cost of cane accounts for nearly about 65 to 70% of total cost of production, cash conversion cost includes the elements of cost like power, chemical and consumables, salary and wages, packing material, repairs and maintenance and over risk.

This we had calculated the average cost of production for various seasons, 2000-01, cane cost is rs904.65/qtls and cash conversion cost was rs248.11/ qtls, total cost of production was rs1319.63/qtls, and now 2006-07 the total cost of production was rs 4/qtls, and now 2006-07 the total cost of production was rs 1416.75, these averages are calculated for factories of those which are 90% or more capacity utilization and assuming crushing 160 days.

Due to the cyclic nature of the sugar industry, the cost of production varies due to cane availability and cane availability is the most important factor for this cost of production, this is the average cost of production for last 7 to 8 years and you will see that cane cost contributes 69%, cash conversion cost is 18%, depreciation is 3% and interest is 10%. This is the details of cane cost, which includes cane price, harvesting and transport cost, purchase tax and the total cane cost and % of cost of total cost of production is there, you will see 2000-01 its 68.55%, then next 65.35%, 64.47%, 60.91%, 72.50%, 76.91% and 71.88%, average of this is 69%. This is the details of processing cost, which includes cash conversion cost, depreciation, interest and last column is total cost of production. During 2003-04 and 04-05, there is less crushing, due to this less crushing the cost of production is higher and 05-06 is also less crushing season so cost of production is higher.

These are the suggestions; cost of cane can be reduced with availability of high yield cane sugar,

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Indian alcohol industry - future challenges by S.K. Mitra, Amrita Verma and S. Kumar

Santosh Kumar

India is one of the largest producer of alcohol in Asia. The annual installed capacity of 300 distilleries is around 3500 million liters(. However, the capacity utilization of distilleries is less than 50% mainly due to the non availability of main raw material molasses. The chances of its being available in large quantities in near future are remote. Since alcohol is viewed as fuel of future, its production assumes great significance in the years to come. The present paper discusses some challenges which are likely to be faced by distilleries in the years to come.

Future challenges

Future of Indian alcohol industry is dependent on many factors and these are variable as well as invariable ones. The competition in domestic as well as global market and the awareness amongst the consumers has forced the industry to be completely modernized and eco friendly. Gone will be the days when we could feel the existence of a distillery from a distance of 4-5 km. This industry is likely to face some challenges in the future years to come. Some of these are discussed.

Raw Materials:

The main raw material used by distilleries is molasses, the byproduct of sugar factories. The availability of molasses to distilleries is dependent on the quantity of cane crushed by sugar factories which in turn is dependent on the production of cane. In past few years molasses availability has been quite insufficient to the distilleries.

The price of molasses is also continuously increasing and Government has also increased taxes on molasses procurement. In near future, availability will be scarcer since most of the current distilleries are increasing

their capacities and new distilleries being installed are of larger capacities. Thus distilleries can not depend solely on molasses as feed stock in coming years.

To overcome the probable acute shortage of molasses in near future, we must look in for using other raw materials for alcohol production. Sugarcane juice is one such alternate. However, considering the present cost of sugarcane it may not be viable alternative but in future years it is most probable that sugarcane is utilized for alcohol production on a mass scale provided Government provides subsidy on its procurement as is the case in U.S. where corn is heavily subsidized for the manufacture of power alcohol. Sweet sorghum is another viable alternate, the cultivation of which should be encouraged to make it a raw material for distilleries in future.

Starchy materials like wheat, rice, corn, sorghum, millets, cassava, potato, sweet potato etc. are also the raw materials of future for alcohol production. Since out of above many are also consumed as food, there may be a debate with regard to food versus fuel as both are important for survival of mankind. However, spoiled and partially spoiled grains may be allowed for alcohol production to meet future demand of energy.

The most abundant carbohydrates present on earth are in the form of lignocellulosics and are represented by grass, trees, wood, grain stalks etc. Due to presence of lignin these have so far not been successfully employed for fermentative production of ethanol.

Need is to concentrate our research in the direction of removal of lignin by simple procedure and for converting cellulose to fermentable sugar. Attempts should also be made to produce and cultivate those plants on large scale which contain very little lignin. Canada is the land richest in lignocellulosic forests and they are planning to screen less lignin containing plants and to plant them on massive scale to meet future demands of alcohol.

Quality of molasses available to distilleries is deteriorating due to extraction of more and more sugar by the sugar factories by using better equipment, better technology and use of a variety of chemicals. Sugar factories producing A grade molasses is a matter of past. At present only B, C and below grade molasses is available to distilleries. Sludge content in molasses is also increasing and so is the case with regard to content of volatile fatty acid (VFA).

Cases of molasses deterioration on storage are also being reported in large nos. Molasses with high sludge and more VFA affect fermentation process to a large extent causing drop in recovery, excessive foaming, drop in yeast cell count etc. Thus fermentation process needs to be continuously monitored and suitably adjusted to have minimum effect of presence of sludge, VFA or microorganisms.

Fermentation:

Since yeast is a living organism and is susceptible to effects of temperature, pH, osmolarity, concentration, substrate etc., it is likely to change its behavior by repeated use for long periods. However, yeast suffers from the drawback of high sludge formation and less specific growth rate as compared to bacteria. Thus in

future years it is most possible that distilleries may use genetically modified bacteria strains having faster specific growth rate, high osmotolerance and tolerance to low pH.

Technology Adoption/Selection:

The available technologies are batch fermentation (which is conventional fermentation process) and continuous fermentation process. Continuous fermentation may be one step process employing one reactor with constant alcohol content with slops and yeast recycling, cascade system using four to five fermenters in a series and cascade with yeast recycling. In batch fermentation process normally installation costs are low and manpower requirement is more, easy contamination control but productivity is low and fermentation efficiency values up to 91% are achievable. On the other hand installation costs are high in continuous system, manpower requirement is less, system is largely automated and productivities high but contamination control is difficult. A large number of distilleries have adopted continuous fermentation systems both cascade and biostil.

Out of these biostil process did not prove successful especially in northern India. Cascade process has so far been successful. However, in many factories the system is also giving trouble e.g. heavy foam in fermenters, high rate of death of yeast cells followed by settling etc. Increased content of sludge in molasses also hampers fermentation in cascade system. Similarly at present VFA content in molasses is high which also hampers fermentation process.

In near future, in addition to above newer problems may be added in molasses fermentation for which we must be ready. Since new raw materials are likely to be utilized in future, problems associated with them also need to be visualized.

Distillation:

Atmospheric distillation is continuously being replaced by MPR (multi pressure redistillation) and total vacuum system at low temperature. MPR is quite common wherein at low steam consumption directly ENA can be produced from fermented wash. At present total vacuum system is gaining importance and in such a system scaling is largely avoided. It is expected in future newer distillation technologies may be developed which will produce rectified spirit and ENA of good quality at the expense of less consumption of energy.

Effluent Treatment Systems:

The oldest primary technology of spent wash treatment is its anaerobic digestion with the recovery of methane rich biogas. However, the composition of spent wash with regard to COD and BOD at present is quite different as used to be earlier in batch fermentation system. Both in cascade and biostil process spent wash generation is 7- 8 liters/l alcohol produced compared to 14 - 15 liter/l alcohol in batch fermentation process.

Thus the solid content of spent wash is nearly double, hence the design of current biogas digester is quite different than earlier plant with regard to maintenance of VFA content, generation of biogas, retention time etc. in addition to a large number of other minor parameters.

Recently RO systems, incineration system etc have been in use and the products of these system are ultimately to be utilized in windrow biocomposting in order not to allow a single drop of spent wash outside by premises. Biocomposting is a very noble method of spent wash bio treatment using press mud and spent wash as such and concentrated spent wash. The major problem with biocompost is its storage and disposal. Another problem which is likely to be faced shall be packing / sale of incompletely composted fertilizer. If it is so happens, the process itself will come to strict scrutiny. Some foolproof arrangement needs to be developed to discourage incompletely composted fertilizer.

Gasohol:

The major use of alcohol in future is going to be in the energy sector especially as ethanol blended petrol (EBP). Ever since the first committee formed in 1979 to examine the use of alcohol as fuel in admixture with gasoline followed by trials by IIT Delhi on vehicle using 5-10 % blends of ethanol in gasoline, with Govt. making it mandatory to use 5% blend in 2005 and then 10% throughout the country w.e.f. Oct' 08 this project is still not at a final stage.

It has always been stated that for EBP sufficient quantity of ethanol is not available/ shall not be available. However, if we want to be self dependent in energy sector we will have to be less dependent on molasses for alcohol production. We have lots of rotten and out of date food grains. 4 million ton of grains can produce 1 - 5 billion liters of ethanol per year. In future need shall be to increase the land for sugarcane crop which is only 7%. An increase of 1 million hectare will produce 75 million ton of sugarcane that can give additional 5.0 billion liters of ethanol. This can also be achieved by raising the yield to 100 T/ha. Biomass to ethanol conversion needs to be commercialized which can be a limit less source of biofuels.

Chairman- thank you all , now I will request my co-chairman, Deepali to say a few words about the proceedings.

Dr. Deepali Nimbalkar- Well I can say it has been a very interesting session specially today, yesterday it was a bit slow, and today we have had a no. of papers on which we have had a very interesting discussion, and even though the no. of participants were less there were supposed to be 14 papers but we have had only 11 paper presented and I hope that the variety of papers which has been presented the no. of issues which have been taken up in this session, this goes to show the importance of co-product in the sugar industry and we can just hope that more interest is generated in future sessions, I will thank my chairman.

Chairman- thank you, so this session was quiet okay and at least for today we were expecting a very small people here but in the end this was really good so whatever ends well is good so I thank all the delegates and my colleague Dr. Deepali, we had a very nice time so thank you.

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