



# CFRI NEWSLETTER



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Established in November 1946, Central Fuel Research Institute is a unique Institute of its kind in India under CSIR, New Delhi to conduct research in different areas of Fuel Science and Technology with emphasis on coal and lignite.

**Mission:** Enhance the position of the Institute as a premier R&D centre for technology development and transfer by forging strategic alliance with other agencies and continuously strive for excellence in the area of potential expertise for generation of basic knowledge, innovation, and advanced concepts in science and technology for economic, efficient, and environmentally safe energy management

## **FINGERPRINTING OF COAL (CSIR Task Force Project)**

Introduction of nitro group substantially enhanced solubilization of coals in aqueous organic solvents. Heat treatment of the oxy-nitrated coal at  $150 \pm 10^{\circ}\text{C}$  in air caused elimination of  $\text{NO}_2$  resulting in lowering of solubility in potent mixed solvents appreciably in aqueous acetone and aqueous tetrahydrofuran. Similar observations hold good for Samla coal also. Nitro groups present in oxy-nitrated coals played an important role in solubilizing it in aqueous organic solvents. The decrease in nitro group was detected by the difference in FTIR spectra and was confirmed by material balance data. A hypothetical route of nitro group elimination and a possible mechanism for reduction of solubility of oxy-nitrated coal consequent upon its thermal treatment in presence of air have been put forward for the first time, which is substantiated by FTIR spectra.

## **ASSESSING THE COKING POTENTIALITIES OF IMPORTED SOFT/HARD COALS IN BLENDS WITH DIFFERENT INDIAN COALS IN VARIOUS PROPORTIONS IN PILOT SCALE (SAIL, New Delhi)**

The objective of the project was to study the coking potentiality of washed Black Water Australian soft coal and its blendability in different proportions with different indigenous as well as imported coals supplied by SAIL. Characterization of both Indian and Australian coals, based on laboratory tests carried out on representative samples drawn from the bulk samples, was made. The characteristics of Australian hard and soft coals have been compared. Size analysis and physical tests of coke produced in electrically heated carbolite test coke oven were carried out after stabilization as per IS: 1354: 1992

method. Also physical and chemical properties were determined.

Based on the results, it was observed that 5% soft coal can easily be blended with the coals as above. 10% soft Black Water coal can be blended if suitable high vitrinite coal is used as in one of the blends. The CSR value of coke from a particular blend has marginally reduced due to blending with comparatively less matured coals in higher percentage. Chemical and petrographic analyses of individual coal can give better picture for making blend. Consumption of hard Australian coal can also be brought down to 35-38% level.

## **SAMPLING, ANALYSIS & ENERGY MANAGEMENT**

1. The task of sampling of imported coking coals unloaded at Vizag and Haldia Ports from a vessel viz. MV Ikan Salman carrying about 50000 t of imported coal was completed and their analyses were performed. Representative coal samples sent to CFRI by SAIL, Calcutta were also analyzed for Total Moisture, VM, S, Crucible Swelling Number and Vitrinite type/percentage, etc. and the report comprising analytical results was sent to SAIL.

2. Under another project "Feasibility studies on the cleaning potentiality of Wardha valley coals" sponsored by M/s Ambuja Cement Ltd, Mumbai, coal samples from three different mine sites of WCL were tested for their characterization, size analysis and size-wise washability followed by simulation study.

3. Heat-affected sample (Jhama) was collected from Digwadih 10 No. Pit (14A seam), BCCL area and tested for its characterization including washability

characteristics under the project "Gainful industrial utilization of heat affected Jharia Coal" sponsored by SSRC.

4. Resource Quality assessment of borehole coal core samples from CMPDI, SAIL, BCCL, SCCL, MECL and coal samples from other organizations like MSEB, MBI, CCO and private parties such as Indorama, Raymond, etc. was made.

5. The energy management activity undertaken by the Institute has recently received a profound response from different industries within Maharashtra. The industrial sectors like dairy and textiles in Maharashtra have shown their keen interest for carrying out the energy audit. Accordingly the proposals have been submitted and favorable response is likely to be received from them.

### **S & T PROGRESS UNDER NETWORKED PROJECTS**

A project proposal entitled "Coal preparation for quality enhancement (CORE - 09)" was approved in principle by the Planning Commission. Consequently a joint meeting with the Scientists of other net-work laboratories viz., RRL, Bhubaneswar; NML, Jamshedpur; RRL, Bhopal and CFRI, Dhanbad was held on 13-14 April 2004 in which distribution of the work, budget requirements, etc. were discussed in great detail. As per CSIR requirements, financial details of the project as a whole and lab-wise requirement in particular were submitted to CSIR (HQ), which in fact has accorded the approval for financial support of Rs. 1400 lakhs. The money is yet to be received by CFRI.

### **NEW CONSULTANCY PROJECTS**

1. Design, drawing, erection and commissioning of non-recovery coke oven for M/s Kirloskar Ferrous Industries Ltd., Karnataka.
2. Erection and commissioning of industrial brequetting plant for M/s. TATA Chemicals Ltd., Gujarat.
3. Erection and commissioning of non-recovery coke ovens for M/s. Usha Fuels Pvt. Ltd, Dhanbad.
4. Fuel usage audit of M/s. Ispat Industries Ltd., Raigarh, Chattisgarh.
5. Sampling and analysis of imported coal, IMFA, Raigada.

### **MOU SIGNED**

1. M/s Kirloskar Ferrous Industries Ltd., Laxmanrao Kirloskar Road, Pune-411 003 for 'Design know-how for setting up a battery of improved beehive coke oven for manufacture of coke' on 07.04.04.

2. M/s National Fuels, Patthar Khad, PO: Kendua, Kulti-713 343, Burdwan (WB) for the process 'Manufacture of smokeless briquette fuel from low grade caking coal/washery byproducts' on 15.04.04

3. M/s Maa Durga Enterprise Vill & PO: Ethora, Burdwan (WB) for the process 'Manufacture of smokeless briquette fuel from low grade caking coal/washery by-products' on 26.04.04

4. M/s Metcoke Industries Ltd. Honnarahalli, Siriguppa TQ, Bellary, Karnataka for 'Design know-how for setting up a battery of improved beehive coke ovens for manufacture of coke' on 11.05.04.

### **PAPER PUBLISHED**

A paper entitled "Studies on char morphology In relation to petrographic characteristics of some Permian coals of India" by N. Choudhury, S. G. Choudhury, C. C. Chakraborty and P. Boral, Journal of Scientific & Industrial Research, Vol.63, April 2004, pp 383-385.

### **WORKSHOP ON SCIENTIFIC AWARENESS YEAR-2004**

A two-days workshop (22-23 April) was held for preparing the strategies and planning for a whole year programme 'Year of Scientific Awareness -2004' in Jharkhand. Dr Kalyan Sen, Director, CFRI was the chairperson for the organizing committee. The workshop was jointly organized by Bharat Gyan Vigyan Samiti, Jharkhand and Science for Society, Jharkhand in which 60 delegates participated actively from various districts of Jharkhand. In this two days programme, deliberations and lectures were given by Shri Abhijit Majumdar, Dr Kalyan Sen, Prof. Shankar Chakraborty, Shri D. N. S. Anand, Dr K. N. Chatterjee, Shri Gurjit Singh and Dr A. I. Khan. A puppet show was also presented by Mrs. Savita Anand. Another presentation on transit of Venus was made by Prof. Shankar Chakraborty.

### **CFRI FOUNDATION DAY**

On 22 April 2004, CFRI Foundation Day was celebrated. On this occasion, Prof. S. N. Mukherjee, Director, Indian School of Mines, Dhanbad, delivered a lecture on the subject 'Higher education and research: the linkages'. Dr Kalyan Sen, Director, CFRI in his welcome address highlighted the untiring and commendable efforts made by Shri H. K. Sen, Chairman of the then Committee that recommended the establishment of this prestigious Institute in the year 1943. He also expressed his gratitude to the founder Director Dr J. W. Whitakar and his successor Dr Adinath Lahiri, who by their dynamic

directions raised the position of this Institute to international repute.

### **NATIONAL TECHNOLOGY DAY**

National Technology Day was observed on 11 May 2004. On this occasion, the Chief Guest Prof. Shankhar Chakraborty, President, Paschim Vigyan Munch, Kolkata delivered a lecture on 'Importance of traditional knowledge for the welfare of the society'. The Guest of Honor Shri D. M. S. Anand, State Coordinator, Science for Society, Jharkhand; Shri S. M. Arora, Former Scientist, NML, Jamshedpur; and Prof. R. S. Pandey, Former Professor, Deoghar College also addressed the audience. Dr Kalyan Sen, Director, CFRI in his welcome address emphasized on the need for utilization of technology for peaceful purposes. Technology is for us, we are not for technology.

### **ANTITERRORISM DAY**

Antiterrorism day was observed on 21 May 2004. All staff members assembled at CFRI Ciburium at 11.00 a.m. to observe antiterrorism day and took pledge to fight against terrorism and violence to uphold and promote peace, social harmony and national integration.

### **DR KALYAN SEN ASSUMED THE CHARGE OF DIRECTOR, CMRI**

On the superannuation of Prof. D.D. Mishra, Director, Central Mining Research Institute, Dhanbad, Dr Kalyan Sen, Director, CFRI took over the additional charge of Director, CMRI, Dhanbad on 30 June 2004 (AN).



Dr Kalyan Sen, Sri S.K. Chawdhuri, Sri S. Kandaswamy, Prof. D.D.Mishra and Sri S.K.Gupta during taking over of the charge

### **WORLD ENVIRONMENT DAY**

World Environment Day (WED) is celebrated all over the world on 5<sup>th</sup> June every year. On the eve of WED, Dr S. N. Mukherjee, Scientist, National Chemical Laboratory, Pune delivered a lecture 'Environment-friendly approaches to mosquito vector management: availability and scope'.



Dr. S.N. Mukherjee delivering lecture on the eve of WED

Yet, another way of expressing the concerns, the execution of the newly received project "Bio-reclamation of low lying area filled with fly ash from Tata Steel's FBC power plant at Jamadoba and associated environmental status" jointly sponsored by both MoEF, New Delhi and TISCO, Jamadoba commenced on WED with the plantation of different fruit, timber, herbaceous, medicinal and ornamental plants by Dr Kalyan Sen, Director, CFRI, Shri R. S. Singh, GM, TISCO, Jamadoba and the officials of both the organizations at its experimental site i.e. Kali Mela.

### **PRESENTATION BY STUDENTS**

Shri Gokul Acharjee and Shri Pramod Kumar, students, Post Graduate Diploma, Mahatma Gandhi Institute of Integrated Rural Energy Planning and Development, New Delhi made a presentation of their work done during their vocational training at CFRI on 28.05.04.

1. Solar photovoltaic cell: their working, application and status in India—Shri Gokul Acharjee
2. Designing of a SSPV System—Shri Pramod Kumar

### **TECHNICAL PRESENTATION**

Shri Ajay Pratap Singh, an expert from [www.sciencedirect.com](http://www.sciencedirect.com), visited CFRI, Dhanbad on 17.06.04. He made a presentation on how to use [www.sciencedirect.com](http://www.sciencedirect.com) for fast access of the scientific matter for our research activities.

### **LECTURE**

Dr. O. P. Bahl, Emeritus Scientist, National Physical Laboratory, New Delhi delivered a lecture 'From Charcoal to Carbon' on 16.06.04.

### **DEPUTATION ABROAD**

Dr. Kalyan Sen, Director and Dr. S.K. Hazra, Scientist 'F' visited China for attending the "2<sup>nd</sup> International Conference for Coal,

Coke Technological Marketing" during 22-23 June 2004 held at Beijing, China.

#### NEW FACILITIES

1. One kg manual stamp charging facility has been procured for making good quality coke from inferior coal.

2. A new toxicity characteristics leaching procedure (TCLP) system (make- Millipore) was installed and commissioned successfully. This facility is uniquely designed to determine the mobility of both organic and inorganic analytes present in liquid, solid and multiphase wastes.

3. The construction of fine coal treatment pilot plant was completed under the supervision of the Consultant (M/s Development Consultant Pvt. Ltd., Kolkata) and CFRI's site Engineers as per the approved design/drawing and an agreement was signed between CFRI and the Contractor M/s MBE, Kolkata. The completion certificate of the works contract was also issued by CFRI. This pilot plant constructed under the works contract "Supply, construction, erection and commissioning of fine coal treatment Pilot Plant (FCTPP) complete in all respects along with instrumentation and data acquisition system at CFRI Dhanbad" was taken over from the Contractor M/s MBE, Kolkata on May 28, 2004 by the Institute.

#### NEW ADDITION IN LIBRARY

Fourteen books including two in Hindi, one souvenir and two reports from DCFRI's office on different subjects like Coal Technology, Mining, Indian Mineral, Rainwater harvesting and Mosquito Control, Technology for Rural India and Women Economic Empowerment are newly added in present Library holdings.

#### PATENT INFORMATION: COAL AND ITS UTILIZATION

1. US Patent Application No. 20040112214 June 17, 2004

Title: Activated carbon for odor control and method for making same

Inventors: Graham, James R. (Fountain Valley, CA)

Abstract: An activated carbon/metal oxide filter element is disclosed. The filter element may be prepared by blending activated carbon, a metal oxide, and a binder to form a filter media mixture and shaping the filter media mixture into a filter body. The filter body may be calcined to form a filter element. The activated carbon/metal oxide filter element may be used to remove odorous compounds, acidic gases and volatile organic compounds from a gas.

2. US Patent Application No. 20040115577 June 17, 2004

Title: Burner, hydrogen generator and fuel cell power generation system

Inventors: Maenishi, Akira (Ikeda-shi, JP); Yotsuya, Motoo (Soraku-gun, JP); Mukai, Yuji (Kadoma-shi, JP); Asou, Tomonori (Kitakatsuragi-gun, JP)

Abstract: The present invention relates to a burner configured to perform combustion using a fuel gas containing a high content of hydrogen and a low content of hydrocarbon based substance. (Source-www.uspto.gov)

#### WORLD AROUND

#### CIBART SETTING UP BAMBOO BASED POWER PLANTS IN NE

The Centre for Indian Bamboo Resource and Technology (CIBART) is setting up a bamboo based power plants in India's North Eastern (NE) States of Manipur and Tripura to answer the problem of erratic electric supply in this part of the region. The first such plant is coming up at Tamenglong district in

Manipur, where a 100 KW unit is being set up. India's bamboo-2 - energy projects have also evinced keen interest from several countries. Gasification is a process in which any biomass (wood chips, dead leaves, twigs, bagasse or farmland refuse) is burnt at very high temperatures, between 700 - 900°C in the presence of a gasifying agent such as air. Bamboo chips have an advantage over other bio mass as they have a higher calorific or heating value, low ash content and alkali index (Source-Chemical Industry News, April 2004)

#### INDIA JOINS IEA GHG

The Govt of India has designated National Thermal Power Corporation (NTPC), Central Electricity Authority (CEA) and The Energy and Resources Institute (TERI) to be the contracting parties in the agreement on its behalf. The IEA GHG programme is now supported by 16 countries, The European Commission and nine industrial sponsors (Source: GHG News Letter No. 71, Jan. - March 2004).

#### DOE DECIDES ON EIGHT PROJECTS FOR CAPTURE & STORAGE OF CO<sub>2</sub>

Described as revolutionary and experimental, eight new projects, recently selected by DOE's Office of Fossil Energy under the solicitation announced in May 2003 by National Energy Technology Laboratory, will explore innovative technologies that could lead to practical and cost effective means of capturing and sequestering CO<sub>2</sub>. These projects prop up the President's Global Climatic Change Initiative, a strategy to reduce US greenhouse gas (GHG) intensity by 18 percent by 2012. The solicitation calls for proposals to carry out advance research in four technical areas viz. separation techniques, subsurface technologies, geo-chemical methods for sequestering carbon and novel niches. Thus the eighth project falls in a technical area, which covers novel projects involving CO<sub>2</sub> recycling and making products. For this, biocatalysts, microorganisms and their enzymes will be investigated for their potential to convert CO<sub>2</sub> to value added products and cause permanent storage of carbon dioxide. These new projects are to be carried out by different groups of researchers of various organizations and the total cost is \$ 4575648 (Source: GHG News Letter 71, Jan-March 2004).

#### CFRI IN MEDIA

1. MoU between CFRI, Dhanbad and Vinoba Bhave University, Hazaribagh for the award of M. Sc. in Coal Science (Hindustan 30.04.04).
2. National Technology Day and Workshop on YSA-2004 organized in CFRI (Hindustan, Aaj, Prabhat Khabar and Dainik Jagaran 12.05.04).

#### EVENTS AHEAD

1. Independence Day on 15 August 2004
2. CSIR Foundation Day on 26 September 2004.

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