



## BULLETIN

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### **CENTRE FOR TECHNICAL EXCELLENCE IN CERAMICS AT ITI**

The Centre for Technical Excellence in Ceramics (CENTEC) was opened recently at the ITI with the objectives of enhancing and improving the competitiveness of the Sri Lankan ceramic industry through innovative research and to be the pioneering institution for R&D and testing, in the area of ceramics. This was initiated as a result of a MoU between the ITI and Sri Lanka Ceramic Council. The other collaborators of the Centre are Universities of Moratuwa, Peradeniya and Alfred University of USA.

CENTEC will carry out routine testing of various ceramic products and undertake R&D projects required by the public and private institutions on ceramics. This testing and research work encompasses a wide variety of methods ranging from physico-chemical analyses to microbial analyses. The advantage of having the CENTEC at the ITI is that the ITI being a multidisciplinary research organization can carry out almost all of these analyses in their state-of-art laboratories under the supervision of their expert research staff. In R&D, CENTEC gets the benefit of the expertise of leading local and foreign scientists.



An added advantage is that with the involvement of ceramic industrialists, first hand knowledge of the production process is available, and this combined with the technical and scientific input of CENTEC staff, will enable the speedy resolution of problems arising in industry. CENTEC is also empowered to issue compliance reports for raw materials and products as per the Sri Lankan or International standards.

The vision of the ITI is to provide demand driven scientific industrial R&D and internationally competitive technical services to catalyse rapid industrialization of the country. Thus building up relationships with the private sector is an important step towards accomplishing this vision.

The setting up of CENTEC, which is functioning at the ITI, is a model, which other sectors of industry could emulate for the betterment of industry.

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**Our Mission**

To provide demand driven scientific industrial R&D and internationally competitive technical services to catalyse rapid industrialisation for the benefit of the people of Sri Lanka

## FACILITIES FOR TESTING TRANS FATTY ACIDS

Trans fatty acids are produced when liquid vegetable or marine oils are partially hydrogenated. These acids play a vital role in health issues such as cardiovascular diseases (CVD) and increased blood cholesterol level. Over the last 15 years metabolic studies have confirmed that in addition to saturated fatty acids, trans fatty acids also have adverse implications on arterogenesis. Compared to saturated fatty acids and cis-unsaturated fatty acids there is an additional risk of increase of CVD by intake of trans fatty acids.

Institutes such as American Heart Association, Food and Agricultural Organization (FAO) of United Nations, Joint WHO/FAO consultation on Diet, Nutrition and Prevention of Chronic Diseases has recommended to decrease the risk of CVD by reducing the intake of trans fatty acids.

Among the general public in Sri Lanka the knowledge on the effects of trans fatty acids and the food products rich in trans fatty acids is not adequate. In some levels of the society there is a growing preference towards the imported vegetable oils compared to local coconut oil.

It is not known that most of these imported vegetable oils are partially hydrogenated and hence the risk of intake of trans fatty acids is high.

The other food products rich in trans fatty acids are margarines, shortenings, and foods prepared using them. In addition repeated frying of foods with same oil will increase the trans fatty acid level in fried foods. Knowledge on trans fatty acids is thus necessary for restaurant owners, food importers and especially food exporters, as the declaration of nutritional facts is mandatory.

ITI has now acquired facilities to identify trans fatty acids using capillary gas chromatography and can undertake the analysis of trans fatty acids in various food items. The Chemical and Microbiology Laboratory also undertakes the preparation of nutritional facts and nutrition information for the food industry.

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## AUTOMATED RAIN GAUGE TO HELP LANDSLIDES MONITORING

Occurrence of landslides have become prevalent in some parts of the country recently. With a view to developing a landslide warning system, a pilot project has been initiated by the Disaster Management Centre, with the collaboration of the Department of Metrology, National Building Research Organization (NBRO) and ITI with financial assistance from the United Nations Development Programme. The role of the ITI in this project is to design, develop and install automated rain gauges in five pre-identified monitoring points in Rathnapura district.

Continuous heavy rain is the main cause for landslides. Presently, the Meteorology Department has only the manually collected rainfall data. An automated device has been designed by ITI to table the rainfall data over a continuous period. The data collected from this device will be sent through GSM as a SMS message to the Meteorology Department and NBRO on an hourly basis. The Meteorology Department and NBRO are the base stations for the collection of data. The data is stored in a personal computer at the base station. The base station can receive data from many remote places at any given time and are capable of handling such data.

The data collected from this pilot study together with rainfall data of the past 20 years will be used to develop a dynamic computer modeling software or a computer model which could



determine the occurrence of a landslide much earlier with higher accuracy.

The rain gauge designed is powered through the national power grid. In the case of a power failure, rechargeable lead-acid batteries allow the system to run smoothly for 3 days. Lightning and surge protection systems come together with the rain gauge as special features. The rain gauge monitors and reports on the rain rate as well as the total rainfall. This automated, low cost, reliable and sturdy rain gauge assures a trouble free operation and requires minimum maintenance.

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## WATER QUALITY SURVEY IN WEERAKETIYA AND THIHAGODA

On request by S & T Officers from Thihagoda (Matara District) and Weeraketiya (Hambanthota District) a team of Research Officers from the Chemical & Microbiological Laboratory of the ITI, carried out a survey on the water quality of selected wells in the above areas. This survey was carried out during the 18th – 25th March 2007 as a social service activity for the World Water Day, which fell on 22<sup>nd</sup> March.

The water samples were tested for physical parameters such as pH, EC, salinity and turbidity; chemically for total hardness, fluoride content and for some samples total iron and nitrate content. Microbiological tests were carried out for *E. coli* and total coliform using laboratory test kits. Basic parameters such as global position, depth and diameter of the wells were also measured. The tests were done on the site in the mobile laboratory of ITI.

Thihagoda village is surrounded by paddy fields. The village is highly populated and the main occupation of the villagers is farming. Well water is used for domestic purposes, and it was observed that the well water in the area is turbid and pale brown in colour. Upon testing, it was found that the turbidity in 80% of tested wells was higher than the required standards. Electric conductivity in 25% was above 1000  $\mu\text{S}/\text{cm}$  and 67% were contaminated with bacteria. Contamination is thought to be mainly due to the dense population. Water sample from the tube well was full of worms due to an unknown cause.



Polluted well

Weeraketiya village is less populated and the main occupation here is animal husbandry. Villagers use rural water schemes for their water requirements. Around 30 – 40 families share a scheme. But in these schemes the water was not properly treated and it was found that eighty per cent of the schemes were contaminated, mainly due to animals. Forty percent of the schemes had high hardness and fluoride values and the

conductivity was greater than 1000  $\mu\text{S}/\text{cm}$ . Fluoride content was very high in Medamulana area.



Testing water samples in the mobile laboratory

High fluoride content in drinking water leads to dental fluoroses. Further, fluoride enhances the corrosion of aluminium and this could affect the aluminium pots that are used to store water. The aluminium - fluoride complexes that are formed as a result of corrosion, could be a cause for kidney failures if consumed. High water hardness is mainly related with the aesthetic value of drinking water and Calcium ions in hard water together with the oxalate or phosphate ions in food can affect the urinary system. Another parameter that was high in tested water was turbidity. This also associated with the aesthetic value of drinking water.

Awareness programmes were done for school children and the general public in these areas. Divisional Secretaries, Public Health Officers, Grama Sevaka Niladaris and S & T Officers also attended these programs. Presently, laboratory trials are in progress to work out simple methods to treat water hardness, fluoride and turbidity.

The team is willing to carry out such surveys in other areas too.

The team that carried out this work comprised of Mr. M. N. A. Mubarak, Mr. Ajith Chandana, Mr. Kamal Werakkody and Ms. Himashi Karunaratne.

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## EQUIPMENT CORNER

### Equipment for the ceramic industry - Dilatometer

Unitherm™ Model 1161V is a fully computerized dilatometer system designed to measure dimensional changes of a specimen brought about by changes in its thermal environment.

It enables the determination of:

1. Linear thermal expansion coefficient
2. Shrinkage attendant to sintering
3. Phase transformations
4. Annealing characteristics and
5. Other related physical or chemical changes.

Studies of processing parameters as reflected by dimensional changes of the material can be studied in great detail through duplication of thermal cycles and rates used in the actual process. Due to the extensive programming available to produce thermal cycles, complex processes can easily be simulated.



The vertical configuration of this instrument makes it especially suitable for testing ceramic materials where shrinkage often is more important than expansion. In a horizontal sample holder, shrinkage of a sample can cause it to pull away from the end plug, resulting in erroneous data. Samples of uniform cross-section are required for optimization of the results.

The dilatometer is a donation to the CENTEC by the United States Agency for International Development (USAID) under the Competitiveness Program. CENTEC is a partnership between the Sri Lanka Ceramic Council and the ITI.

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