
Microscale Experiments in Chemistry: Initiatives in Implementation

There is widespread concern that student interest in science and science-related careers has waned almost to the point where the future of science and technology in India is in jeopardy. Strenuous efforts are being made to remedy the situation. The emergence of *Resonance* is itself an important development with this laudable objective.

One of the major factors in stirring young pupils' imagination and interest is the facility to observe and understand chemical processes through experiments in the laboratory. Traditionally students are required to conduct experiments with set parameters using life-size equipment in a laboratory. The demand for space and the cost of establishing and maintaining a laboratory have meant that a large number of high schools and undergraduate colleges do not have laboratories.

A recent development, pioneered in India by Professors Kelkar and Kamat in Pune and Goa Universities promises to get over this problem by conducting experiments using microscale techniques. This technique was first widely disseminated in India by an article in *Resonance* in October 2000. Since then, the application of this technique to a variety of experiments has been described in several follow-up articles by Professor Kelkar. Initial trials in a few schools in Maharashtra and in Goa have been reported to be encouraging. The equipment and chemicals required for experiments for high school classes costs only in the range of a few thousand rupees; this fact makes it feasible to bring this facility within the reach of large numbers of students at low cost.

Initiatives of the Rotary Club of Bangalore Cantonment (RCBC)

RCBC is a service-oriented group with a strong focus on ground level work aimed at improving educational attainments in schools and also toward rendering primary and secondary education of good quality accessible to segments of society who are currently denied such facilities. The article in *Resonance* on 'Microscale Experiments in Chemistry' caught the attention of RCBC members who recognised its potential for promoting Rotary's objective of creating awareness. Accordingly, RCBC took the initiative to contact several schools in the Bangalore area and invited Professors Kelkar and Kamat to demonstrate the new technique at a workshop in Bangalore and also hold demonstrations in a few schools where students could also participate. The workshop and the demonstration in three schools were held on 19/20 January 2001. The workshop was attended by twenty five science teachers from eleven schools and Principals of two schools.

With the enthusiastic support of the authorities of Frank Anthony Public School, the Little Angels Modern High School and the Mahila Seva Samaj School, the professors demonstrated several experiments in these schools. Students of standards 9 and 10 from these schools as well as a few others in the vicinity participated. Over 125 students were thus provided an opportunity to acquire a feel for the technique. The demonstrations covered the following experiments:

1. Generation and detection of NO-x (nitric oxide and nitrogen dioxide).
2. Generation of oxides of sulphur, and oxides of carbon.



3. The generation of an enclosed polluted environment and its chemical behavior.

Demonstrated benefits

1. It is possible to devise these experiments to match requirements of existing syllabi e.g., the activities prescribed in each chapter in NCAER textbooks.
2. The material required for a class of forty students (say) could be carried out in a suit case to the classroom, thereby avoiding the need for an elaborate laboratory and the movement of students during school-hours.

The students were particularly excited by the facility for direct observation of chemical reactions in progress at their desk rather than be content with noting end results. This is perhaps a very important benefit for inspiring students in the pursuit of science and in sparking their innovative impulses.

RCBC plans

The feedback from teachers has been uniformly enthusiastic and RCBC feels encouraged to proceed further to catalyze the implementation of the technique. RCBC is in touch with the professors for this purpose and has drawn up a plan for the implementation of this technique this year, at least in a few other schools. The first step will be to bring out operation manuals that describe the experimental procedures in a standard format. RCBC thereafter proposes to invite participation by as many schools as possible for a *detailed familiarization camp* for teachers, which could span a few days. By keeping the fee for participation at a nominal level – just adequate to recover the cost of publication and related conference arrangements – it is hoped that a large number of schools, including some government schools, will participate.

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Please Note:

Resonance, Vol. 6, No.9, 2001, Page 59. Conjecture 4.6 should read as

An irreducible integral polynomial f , all of whose integral values $f(n)$ are not divisible by any integer >1 , takes on a prime value.

Acknowledgements

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