

Proposal for announcing seat under the Institute Internship Program

(separate form to be filled for seat under Institute funding and project funding)

1. Name of faculty member proposing: Dr. Madhu Agarwal
2. Department/Centre: Chemical Engineering
3. Topic on which work is proposed: synthesis and characterisation of new composite adsorbent for simultaneous removal of fluoride and arsenic from groundwater
4. Preferred period of internship (after May 20th): Between 25 May 2024 to 15 July 2024
5. Qualification of student (branch/semester of study): Chemical/Biotechnology/Nanotechnology/Petroleum Engineering (II, III and IV Year)
6. Brief description of work (300-500 words): Most of the literature reports the presence of arsenic (As) and fluoride (F⁻) in groundwater as individual elements and their harmful effect on human health. If the concentration of F⁻ in drinking water is more than the permissible level, then different health effects like dental and skeletal fluorosis, including other health effects such as cardiovascular effects, neurological effects, endocrine effects, reproductive effects, etc are manifested in the human body. Similarly, if the concentration of As in drinking water is more than the permissible limit, then it shows its various health effects such as central nervous system effect, cardiovascular disease, diabetes, renal system effects, enlarged liver, bone marrow depression, high blood pressure, skin diseases and finally different forms of cancer also. However, when two occur simultaneously and are ingested, their behaviour may be synergistic or antagonistic, which is still unknown. As per the reported research, the simultaneous presence of As and F⁻ may result in more integrity in the cells' genetic material than individual exposure. Co-exposure of As and F⁻ in rats studied at very low concentrations resulted in decreased comet tail and detrimental effects on the liver and kidney.

Therefore, in this proposal, we wish to remove simultaneously As and F⁻ from water through the synthesis of new composite adsorbents. The removal experiments will be performed to synthesise new adsorbent material with high efficiency to adsorb both As and F⁻ simultaneously. The synthesised adsorbents will be characterised using different techniques such as BET, SEM, XRD and FTIR to elucidate their As and F⁻ removal mechanisms. The batch experiments will be performed to optimise the process parameters for the efficient simultaneous removal of As and F⁻.

7. Expected learning of student (upto 100 words):
- ❖ Hands-on learning allows students to learn through experiments
 - ❖ Students will learn to synthesise composite adsorbent and their characterisation.
 - ❖ Students will learn to use analytical instruments to evaluate fluoride and arsenic presence in water.
 - ❖ The synthesised adsorbents will be characterised using different techniques such as BET, SEM, XRD and FTIR, so the students will be able to analyse data obtained through these techniques.
8. Nature of work: (Experimental/simulation/mathematical modelling/data collection-analysis etc.) (upto 50 words): Experimental, mathematical modelling and data analysis.
9. If the seat is under project sponsored category: No
- a) If yes, number of seats announced:
 - b) Name and ID no. of project from which stipend is chargeable



Signature of faculty member

Chemical Engineering Department
Name of department/Centre

Note:

- a) Proposing faculty member needs to be available at the Institute during the period internship is offered
- b) No extra space or funding than the stipend will be provided by the institute for this purpose