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DECLARATION BY THE CANDIDATE

I, **Laxmi Deepak Bhatlu M**, certify that the work embodied in this Ph. D. thesis is my own bona fide work carried out by me under the supervision of **Dr. Satya Vir Singh** and the co-supervision of **Prof. Ashok Kumar Verma** for a period of 5 years 5 months from September 2011 to February 2017 at Department of Chemical Engineering & Technology, Indian Institute of Technology (BHU), Varanasi, India. The matter embodied in this Ph. D. thesis has not been submitted for the award of any other degree/diploma.

I declare that I have faithfully acknowledged, given credit to and referred to the research workers wherever their works have been cited in the text and the body of the thesis. I further certify that I have not willfully lifted up some other's work, paragraph, text, data, results, etc. reported in the journals, books, magazines, reports, dissertations, theses, etc., or available at web-sites and included them in this Ph. D. thesis and cited as my own work.

Date:

Place: Varanasi

(Laxmi Deepak Bhatlu M)

CERTIFICATE FROM THE SUPERVISOR(S)

This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

(Prof. Ashok Kumar Verma)

Co-supervisor

(Dr. Satya Vir Singh)

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