

**Summary**

Results-driven Chemical Engineer with over 7 years of experience in fluid dynamics, heat transfer, and particle flow dynamics. Demonstrated expertise in process optimization, computational fluid dynamics (CFD), and process safety management. Proven ability to lead cross-functional teams, improve manufacturing processes, and enhance product quality. Committed to driving innovation and sustainability within the chemical manufacturing sector.

**Core Skills**

* Chemical Process Design
* Process Simulation and Modeling
* Process Safety Management
* Project Management
* Technical Report Writing
* Environmental Regulations and Sustainability
* Team Collaboration and Leadership
* Problem Solving and Critical Thinking
* Ansys Fluent (CFD), Ansys Rocky (DEM), OpenFOAM
* MATLAB, Python, Machine Learning
* High-performance computing environment experience

**Experience**

**Senior Process Engineer** – 02/2023 to Present

**Dr. Reddy’s Laboratory**, Hyderabad, INDIA

* Developed and optimized CFD models for various pharmaceutical manufacturing processes including mixing, crystallization, drying, and tablet coating.
* Led process improvement initiatives, focusing on scaling up manufacturing processes and ensuring process efficiency.
* Utilized Discrete Element Method (DEM) for developing particle dynamics models, improving equipment performance such as blenders and tablet coaters.
* Conducted extensive case studies to validate CFD models and simulations at both laboratory and plant scales.

**Education**

**PhD (7.14/10)**, *Chemical Engineering*, Indian Institute of Technology, Roorkee, India*,* (Dec. 2017-Jan. 2023)

* Modelling of Multiphase Fluid Flow and Heat Transfer Enhancement using Curved Surface. (PhD thesis).

**M. Tech**. **(7.65/10),** *Chemical Engineering*, Indian Institute of Technology, Roorkee, India*,* (2015-2017)

* Heat transfer in curved channels, and
* Enhancement of Heat transfer in spiral coil using Nano-fluids.

**B. E**. **(72.68%),** *Chemical Engineering*, Institute of Engineering, Jiwaji University, Gwalior, India (2010-2014)

* Process Upgrading of Heavy Crude Oil In-Situ Using Hydrogen.

**Patents (2)**

1. Kushwaha, N., Kumar, V., Twisted Elliptical Tube-In-Tube Helically Coiled Heat Exchangers. Indian Institute of Technology Roorkee, (Class: **23–03**; Filed on: **10.09.2022;** File number: **370616-001**;Granted on: **25.01.2023)**.
2. Kushwaha, N., Silori, G., Kumar., V. 2021. A system and method for extracting shikimic acid from Chir pine needles. Application number **202111038776** dated **26.08.2021** (Published on 22/07/2022).

**Project (1)**

* Design Innovation centre (DIC) IIT Roorkee P2P project entitled “*Investigation of a Himalayan pine species as a potential drug in the treatment of Swine flu (H1N1)*”. Project Id-DIC-P2P-2018-19-05.

Naveen Kushwaha

Senior Process Engineer, Dr Reddys Lab. Hyderabad, INDIA

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**Fellowships And Awards**

* Mitacs globalink research award 2021
* The ministry of human resource development (MHRD), India fellowship at Indian Institute of Technology, Roorkee in PhD (dec 2018 to dec 2022).
* The ministry of human resource development (MHRD), India fellowship at Indian Institute of Technology, Roorkee during m. Tech. (July 2015 to Jun 2017).
* Team leader in “Vigyan Manthan-Mission Excellence Programme” organized by M.P. council of science and technology, Bhopal, India during 27th January to 6th February 2008.
* All India rank two (silver medal) in all India computer knowledge competition organized by national research institute of knowledge development, Chennai, India, 2005.

**Publications (7)**

* Kushwaha N, Vikash, Kumar V. “Impact of Mixed Convective and Radiative Heat Transfer in Spiral-Coiled Tubes”. ASME. J. Heat Transfer. 2019; <https://doi.org/10.1115/1.4043946>.
* Silori G.K., Kushwaha N., Kumar V. (2019) “Essential Oils from Pines: Chemistry and Applications”. In: Malik S. (eds) Essential Oil Research. Springer, Cham. <https://doi.org/10.1007/978-3-030-16546-8_10>
* Kushwaha N., Kumawat T, Nigam K, Kumar V. "Heat Transfer and Fluid Flow Characteristics for Newtonian and Non-Newtonian Fluids in a Tube-in-Tube Helical Coil Heat Exchanger" Ind. Eng. Chem. Res. 2020, 59, 9, 3972–3984; <https://doi.org/10.1021/acs.iecr.9b07044> (Invited manuscript for the special issue of “Characterization and Applications of Fluidic Devices without Moving Parts”).
* Kushwaha N., Kumar V. “Numerical Study of Saturated Boiling Heat Transfer over the Flat and Curved Surfaces”. Heat Transfer. <https://doi.org/10.1002/htj.22640>.
* Kushwaha N., Sasmito, A.P., Kumar V. “Vapour Bubble Dynamics and Heat Transfer Characteristics During the Boiling over the Spherical Surface” Heat Transfer <https://doi.org/10.1002/htj.22727>
* Kushwaha N, Jain N., Kumar V, Nigam K.D.P., “Numerical Study of Liquid-Liquid Two-Phase Flow through Coiled Flow Inverters: Effect of Volume Fraction, Dean Number and Orientation” Chem. Eng. Sci. 2023, 268, 118409 <https://doi.org/10.1016/j.ces.2022.118409>
* Kushwaha N, Kumar V, “Impact of Coil Curvature, Pitch, and Orientation on Vapor Hydrodynamics over Helically Coiled Tubes during Saturated Pool Boiling near Critical Pressure” Industrial & Engineering Chemistry Research, 62, 43, 18063-18078 <https://doi.org/10.1021/acs.iecr.3c02629>

**Conferences (6)**

* **Kushwaha N,** Kumar V, “Numerical Study of Saturated Pool Boiling Over Horizontal Tube”, 9th International and 49th National Conference on Fluid Mechanics and Fluid Power (FMFP 2022)
* **Kushwaha N,** Kumar V, “Saturated Pool Boiling of Hydrogen over the Cylindrical Rod”, International conference on Chemical Engineering: Enabling Transition Towards Sustainable Future (Chemtsf 2022)
* **Kushwaha N**, Jain N, Kumar V, Nigam KDP “Numerical Study of Liquid-Liquid Two-Phase Flow through Coiled Flow Inverters: Effect of Volume Fraction, Dean Number and Orientation” 15th International Conference on Gas-Liquid & Gas-Liquid-Solid Reactor Engineering (GLS 2022, AIChE)
* **Kushwaha N.,** Kumar V. “Numerical Simulation of Film Boiling over Sphere using Suppressed Interface Tracking Method: A Two-Phase Approach” 16th international conference on heat transfer, fluid mechanics and thermodynamics (HEFAT-2022)
* **Kushwaha N.,** Kumar V. “Numerical Simulation of Film Boiling over Sphere using Suppressed Interface Tracking Method: A Two-Phase Approach” 15th international conference on heat transfer, fluid mechanics and thermodynamics (HEFAT-2021)
* **Kushwaha N.,** Kumar V. “Thermal performance enhancement in the spiral coiled tube heat exchanger using nano-fluids” Complex Fluids Symposium 2020 (COMPFLU-2020)

**Grants**

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| * Co-PREPARE Academic Grant (CAG) for webinar on “Scientific & Academic Writing” | |
| * Marco fund for SWEP Workshop 2021 | * Jagdish Narain Travel Grant. |
| * Shri S.P. Elhence Memo. Travel Grant. | * Rai Bhadur Narain Travel Grant. |

**Skills**

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| * Ansys Fluent (CFD) * Ansys Rocky (DEM) * OpenFOAM | * MATLAB * Machine Learning * Python |

* Proficient in Fluid Dynamics, Heat Transfer, and Mass Transfer phenomena with strong mathematical ability.
* Skilled in programming with proficiency in Python, Matlab, and experience in a Linux-based high-performance computing environment.
* Hands-on experience with CFD software, including Ansys Fluent, Ansys Rocky, Workbench, and Design Modeler/SpaceClaim.
* Capable of performing simulations, optimizing designs, and validating results through comparisons with experiments and literature.
* Proficient in creating insightful visuals and animations such as contour plots, flow profiles, and path lines.
* Skilled in assessing and effectively communicating the impact on process understanding, efficiency, and robustness.

**Equipment Handling**

**•** Rheometer (Anton Par MCR702) • HPLC (waters)

**Services**

* DAPC member at Department of Chemical Engineering, IIT Roorkee (2018-2019)
* As reviewer in “Energy Conversion and Management” journal