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Green Synthesis of Transition Metal Oxides Nano-Particles (TMONPs) and Applications

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Green chemistry has become more significant in latest scenario of designing new molecules or synthesis of new nano-particles as it involves no harmful toxic substance and environment friendly process is adopted. Different types of metallic, non-metallic nanoparticles are being synthesized for providing mechanical, electrical or optical properties to the desired materials. In this study focus has been done on green synthesis of 3d or 4d series transition metal oxide nano particles (TMONOPs). Sol-gel or modified hummers method have been employed to get various nanoparticles. Better way of getting nanoparticle through green chemistry involves use of plant extract. For this purpose plant extracts in different polar and non-polar solvent is taken and heated with precursor which is transition metal salt in the form of chloride or sulphate and then treated with some mechanical action. Natural plant extract rich with ascorbic acid or citric acid or some alkaloid or flavonoids is preferred which reduces bigger molecules of transition metal salts and then reduces to smaller nanoparticles. In this study synthesis of nanoparticles of 3d transition metals like Sc, Va, Ti, Cr, Mn, Fe, Co, Ni, Cu Zn, Ag etc have been done successfully. Nanoparticles of titanium dioxide have application in cosmetics or paper industry to provide high brightening property or Uv protecting nature. Zinc oxide nanoparticles have antioxidant nature, silver oxide, copper oxide nanoparticles have very good antimicrobial property. Such synthesized nanoparticles have extensive applications in various fields like cosmetics, food packaging, medicines etc. With the demand of increasing nano scenario with green chemistry it is also named as sustainable chemistry.

Key words: Green chemistry, green synthesis, plant extract, nano-particles

Biography

Dr. Ajay Singh has done his B Sc & M Sc in Chemistry from Meerut University. He has also done a PG Diploma in Pulp & Paper Technology. He holds a Ph D in Polymer Chemistry. He has taught at Thapar Group of Institutions & Dolphin Institute. He joined Uttarakhand University in 2008 as Assistant Professor & HOD Chemistry and is now Dean & HOD Chemistry at Uttarakhand College of Applied and Life Sciences. He received excellence in Researcher Award –Uttarakhand 2021, awarded by Shri Puskar Singh Dhami CM of Uttarakhand, on 5th Sept, 2021 in UTU Auditorium for patent and research.

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