the catalytic oxidation reaction. The extent of mineralization of the pollutants mainly depends upon the reaction conditions and the nature of pollutants. During the hydrothermal process, several reactions such as hydrolysis, decarboxylation, and oxidation which may occur in series or parallel, are responsible for the removal of contaminants. CWO is reported to follow free radical reaction mechanism which takes place in three steps: initiation, propagation and termination. The generation rate of free radicals with high oxidation potential (such as hydroxyl radicals) has significant impact on the reaction.

One of the major constraints in the installation of wet oxidation process for real waste streams is the requirement of elevated conditions. The high reaction temperature can be maintained for the waste stream with chemical oxygen demand (COD) greater than 10000 mg/L without supplying external energy since the process is exothermic and generate enough heat to sustain the reaction. But the high capital costs make the process unattractive to the wastewater treatment plant operators. Therefore, the ongoing efforts are focused on the development of a catalyst system which should be inexpensive, workable at low to moderate temperature conditions and reusable. However, several previous studies have demonstrated that the low and moderate CWO are not very efficient for the removal of acetic acid (a low molecular weight carboxylic acid) which is the major intermediate compound forms during the oxidation of organic pollutants. Therefore, the recent studies are often planned for the partial degradation of organics into low molecular weight acids which are generally biodegradable and can be utilized as carbon source by microbes during the biological oxidation. In this manner, the CWO process can be integrated with conventional and eco-friendly biological treatment methods for the decontamination of waste streams containing non-biodegradable and toxic pollutants.

The CWO studies on pulp and paper effluent at moderate conditions (120 - 190°C temperature) suggests the removal of organics due to the combined effect of adsorption and oxidation. The leaching of the active metal specie is one of the major concerns with the use of heterogeneous catalysts which needs to be addressed in the future studies.

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A Study on Radiation Field Modeling in Photocatalytic Reactors Used in Wastewater Treatment

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In order to design, scale up and evaluate the performance of photocatalytic reactors, it is vital to accurately predictlight intensity distribution in the photocatalytic reactors. Light intensity distribution in the space of photoreactors is obtained by solving radiation transfer equation (RTE). Since RTE is an integrodifferential equation, it can be solved by numerical methods. Recent research shows that Mont Carlo (MC), Discreteordinate (DO) and Finite volume (FV) are appropriate methods to solve RTE and yield accurate results [1, 3].In this study an exhaustive literature review was carried out to investigate the application of mentioned methods to solve RTE. Positive features and drawbacks of each numerical approach as well as the ways to avoid the drawbacks were considered [3].In addition, the usage of computational fluid dynamics (CFD) to enhance the simulation of radiation field in both homogenousand heterogeneous photocatalytic reactor was comprehensively studied. Also, crucial parts to solve RTE numerically such as boundary conditions (BC), optical properties of the medium, and phase function were investigated [1, 2, 3, 4].

In the MC method the reaction space is divided into cubical cells. Then, the trajectories and fates of all the photon emitted from the radiation source (lamps) are traced. Both trajectories and fates are defined by estimating random numbers, so the most critical operational parameters for the efficient MC modeling is the generation of random numbers which was explained thoroughly. MC method is easy to use and usually is faster than DO and FV methods to solve RTE [3]. In the DO approach, RTE is solved by directional and spatial discretization of the radiation fieldresulting a set of linear simultaneous equations for the radiation intensity at various points. The fact that DO method does not meet conservation of radiation intensity at the surface of complex geometries particularly for anisotropic scattering is the most important drawback of this modeling. To avoid this disadvantage FV model is used. In this approach the RTE is integrated not only over control volume but also over control angle, so the conservation of radiation intensity is maintained and precise results are obtained. On the other hand, control overhang and ray effect reduce the accuracy of results in FV modeling. All the ways to tackle mentioned problems were gathered in this study [3].

Conventional boundary conditions to solve RTE are lamp emission models and reactor walls. In present study some lamp emission models used in photoreactor modeling were reviewed [3, 4]. The application of CFD method has been enabled researchers to adopt a new approach and consider UV lamp as a part of computational domain. Therefore, the effects of refraction, absorption and reflection of radiation at the air/quartz/water interface and the absorption and re-emission of photons by the lamp plasma were investigated. The results of such a modeling show very good agreement with experimental measurements [2]. The other BC to solve RTE considered thoroughly in this studyis reactor wall. The nature of the reactor wall (transparent, black body and non-transparent) and how it reflects the light (specular or diffuse reflectivity) affects radiation field in photoreactores. Moreover, in heterogeneous photoreactors the impact of catalyst loading on wall reflectivity was discussed [1, 3].

Scattering and absorption coefficient along with phase function are optical parameters of the reaction medium that play a crucial role in solving of RTE. These parameters depend on the type of catalyst and also wavelength. In this study the concept of wavelength averaged optical properties to solve RTE and the effect of agglomeration on scattering and absorption coefficient in heterogeneous photoreactors werereviewed [3, 5].

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ST-13

Influence of Doping on Self Cleaning Property of Photoactive Nanopaints

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TiO_2 and $ZnSO_4$ has vital role in paper and paint industry. It is used as a photo catalyst under UV light. To extend its photocatalytic activity in visible light, photocatalytic nano materials were doped with $AgNO_3$ and $CuNO_3$. Hence the present work is aimed to assess the photo catalytic antimicrobial activity of doped photo catalysts (1%) blended paints in the visible light. The different treatments performed to assess the self cleaning property were Growth control (T_1) illumination control (T_2), PC control (T_3), PC test (T_4), Paint control (T_5), Paint with illumination (T_6), Paint and PC control (T_7), Test (T_8). Illumination was given with 9 watts and 15 watts lamp from the height of 3feets for 5hrs. At each hour the sample was collected from each treatment and plated. After 24hrs of incubation the colonies was counted and the graph was plotted between time in x-axis and cfu/ml in y-axis. It was found that, in T_4 and T_8, 100% efficiency was achieved at 1^{st} hour in both 9 watts and 15 watts