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A REVIEW ON WASTE DERIVE HETEROGENEOUS CATALYST FOR FENTON-LIKE OXIDATION PROCESS

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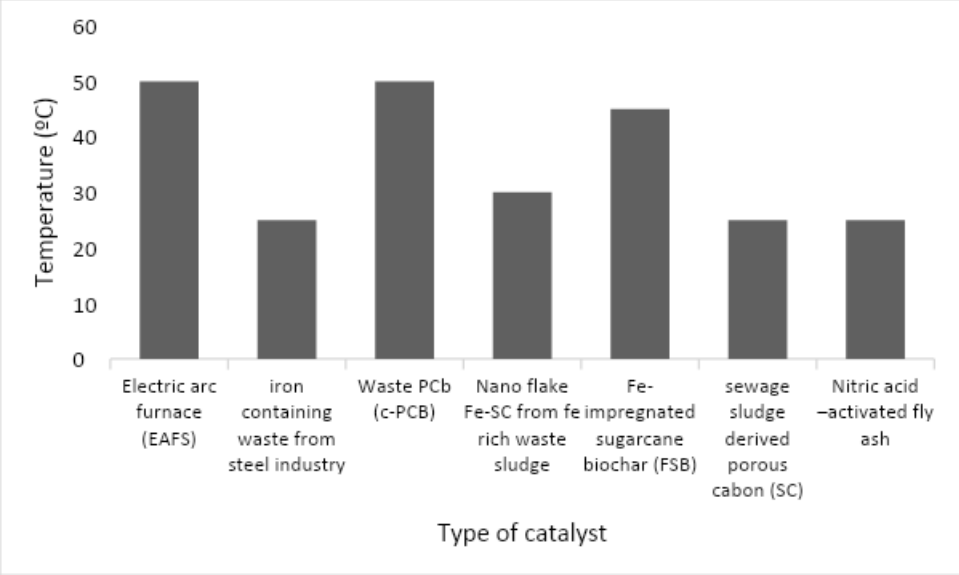
Abstract: Fenton process is one of the most popular method used to treat organic wastewater where Fe^{2+} is used as catalyst and hydrogen peroxide (H_2O_2) as an oxidant. İn this comperative study, a waste derived heterogeneous catalyst from many type of materials such as metal waste and agricultural waste were analyse. The aims of this study is to review the potential of waste derived heterogeneous catalyst for the removal of organic pollutant in wastewater and to analyse the limitation of the potential waste derived heterogeneous catalyst for Fenton-like process. The data used in this study were the secondary sources such as online journals and articles and online books. Process parameters such as pH, catalyst dosage, H_2O_2 concentration, initial dye concentration and temperature were reviewed. From the results, catalyst derived from waste material can degrade more than 90% of the organic pollutant in the wastewater. The result also shows that the catalyst can operates at wider pH range. İnstead of using room temperature, some of the waste derived catalyst can also operates at temperature more than 40 ºC. Lastly, the used of waste derive heterogeneous catalyst can reduce the cost of operating and reduce the amount of solid waste send to the landfill. Hence, it is a good practice to save the environment.

***Keywords*:** Fenton, waste-derive catalyst, dye, wastewater, decolourization

Results:

Table 1: Type of Metal Waste

Catalyst	Pollutant	Efficiency	Reference
Electric arc furnace	Reactive blue 5	99% decolourization of reactive blue 5	[12]
FeO-constituted iron slag waste	Reactive Red 24	89 % decolourization	[30]
Fe-rich waste sludge derive nano-flake Fe-SC hybrid	Acid orange 2	98% removal	[32]
Reuse Fenton-sludge derive $NiFe_2O_3$	Phenol	95% removal	[33]
Metal doped magnesium ferrite ($MgFe_2O_4$) from saprolite laterite leaching solution	Rhodamine B	97.8% degradation	[11]



Conclusion

Catalyst derived from the waste materials listed in this review paper shows excellent performance towards the degradation of organic pollutants in wastewater. The results shows almost all waste-derived catalyst can degrade more than 90% of the pollutant in the wastewater. Catalyst use in the Fenton-like treatment process plays an important role to degrade the wastewater. Iron leach and availability of the actives sites of the catalyst are two factors that can affect the type of catalyst use. Hence, the catalyst derived from waste materials show low iron leaching and very highly reactive to degrade the organic wastewater.

Some study revealed that pH 3 is the optimum pH value for the Fenton-like process however, some of the waste-derived catalyst review in this study illustrate that the organic pollutant in the wastewater can be degrade excellently at wider pH range. Hence, it shows that the waste-derived catalyst have a good possibility to extend the optimum pH to neutral or alkaline.

Finally, cost of treatment plays an important features when dealing with the industries. A low cost treatment should be the main objective when dealing with the wastewater treatment. Instead of reducing the amount of solid waste send to the landfill, a waste derived catalyst can also being beneficial as cost effective heterogeneous catalyst for Fenton-like process to treat wastewater.