IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, April 2024

Review on Emission Control System in IC Engine by 3 Way Catalytic Converter with Aluminium Oxide and Titanium Di-Oxide

Mr. Yash Golesar, Mr. Hitesh Patil, Mr. Sanket Wagh, Mr. Chetan Kotake, Prof. T. Y Saindane
Loknete Gopinathji Munde Institute of Engineering Education and Research, Nashik, Maharashtra, India

Abstract: *The ever-increasing concern over environmental pollution has prompted the automotive industry to focus on developing efficient emission control systems for internal combustion (IC) engines. Catalytic converters, particularly the Three-Way Catalytic Converter (TWCC), have emerged as a crucial technology for reducing harmful emissions from vehicles. This review explores the role of TWCCs in controlling emissions, with a specific emphasis on the use of aluminium oxide (Al2O3) as a catalyst support material.The review begins by discussing the fundamentals of TWCC operation, including the conversion of pollutants such as carbon monoxide (CO), nitrogen oxides (NOx), and hydrocarbons (HC) into less harmful substances. It then delves into the various factors influencing TWCC performance, such as temperature, exhaust gas composition, and catalyst formulation.*

A significant portion of the review is dedicated to examining the use of aluminium oxide in TWCCs. Aluminium oxide, known for its high surface area and thermal stability, plays a crucial role in supporting the active catalytic components, such as platinum (Pt), palladium (Pd), and rhodium (Rh). The review highlights the impact of aluminium oxide properties, such as pore size and surface area, on TWCC performance. Furthermore, the review discusses recent advancements and challenges in TWCC technology, including the development of novel catalyst formulations and the integration of TWCCs with other emission control technologies. Finally, the review concludes with a discussion on the future prospects of TWCCs in IC engine emission control and the potential for further enhancing their efficiency and durability.

Keywords: environmental pollution

REFERENCES

[1] S. Arunkumar, M. Kankeyan, V. Muneeswaran, M. Ramesh Aravind, Exhaust emission reduction in si engine using catalytic converter with silicon dioxide & alumina with silica as catalysts, Int. J. Res. Mech. Mechatron. Automobile Eng. (IJRMMAE) 2 (1) (2016) 72–78, ISSN Print: 2454-1435, ISSN, Online: 2454- 1443.

[2] Prakash Kumar Sen, LakhanPuriGoswami, Shailendra Kumar Bohidar, Effect of catalytic converter and EGR system on emission characteristic of IC engine, Int. J. Adv. Technol. Eng. Sci. 03 (01) (2015), ISSN (online): 2348 – 7550.

[3] S.P. Venkatesan, Desai ShubhamUday, Borana Karan Hemant, KagitaRajarshiKushwanthGoud, G. Lakshmana Kumar, K. Pavan Kumar, I.C. Engine emission reduction by copper oxide catalytic converter, IOP Conf. Seri. Mater. Sci. Eng. 197 (2017), https://doi.org/10.1088/1757-899X/197/1/012026 012026.

[4] TejasVimalrayRaval, NityamOza, Exhaust gas analysis of compression ignition engine using copper-cerium oxide coated wire mesh catalytic converter, Int. J. Innov. Emerg. Res. Eng. 3 (2) (2016), e-ISSN: 2394-3343, pISSN: 2394 – 5494.

[5] M.S. Suresh Kumar, S. Madhu, Optimization of catalytic converter of engine with and without fuel additives, J. Chem. Pharm. Sci., ISSN: 0974-2115.

[6] G. Jamuna Rani, Y.V. Hanumantha Rao, B. Balakrishna, Experimental analysis on emissions & back pressure of a diesel engine using catalytic converter with air-box, Int. Res. J. Eng. Technol. (IRJET) 03 (07) (2016), e-ISSN:2395-0056, pISSN: 2395-0072.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, April 2024

[7] B. JothiThirumal, E. James Gunasekaran, Loganathan, C.G. Saravanan, Emission reduction from a diesel engine fueled by cerium oxide nano-additives using SCR with different metal oxides coated catalytic converter, J. Eng. Sci. Technol. 10 (11) (2015) 1404–1421.
[8] P.L.S. Muthaiah, M. Senthilkumar, S. Sendilvelan, Experimental analysis of a catalytic converter using supported copper catalyst to reduce NOx and PM from diesel engine, Int. J. Mech. Automobile Eng. 10 (01) (2010) 1–7, ISSN 0974-231X, IJMAE, June 2010–August 2010, Fall Edition.
[9] PatilAjinkyaBhaskarrao, M. ShindeRajaram, Development of catalytic converter for emission control of stationary diesel engine, 1(4) (2015) ISSN (Print): 2394-6202, (Online):2394-6210.
[10] Ajin C. Sajeevan, V. Sajith, Diesel engine emission reduction using catalytic nanoparticles: an experimental investigation, J. Eng. (2013), 9 p. 589382.
[11] Vít Marek, LukášTunka, Adam Polcar, DušanSlimarˇík, Reduction of NOx emission of a diesel engine with a multiple injection pump by SCR catalytic converter, ACTA Univ. Agric. Silvicult. MendelianaeBrunensis 64 (4) (2016) 135.
[12] Nikit B. Patel, Saurabh B. Patel, Milan S. Patel, Diptesh Patel, Reduction in harmful exhaust gas emission with use of catalytic converter and fuel magnetizer, IJSRD – Int. J. Sci. Res. Dev. 2 (02) (2014), ISSN (online): 2321- 0613.
[13] Mohan T. Tayde, Chetankumar M. Sedani, Int. J. Innov. Res. Sci., Eng. Technol. 4 (6) (2015), ISSN (Online): 2319-8753, ISSN (Print): 2347-6710.
[14] Michael P Harold, NOx storage and reduction in lean burn vehicle emission control: a catalytic engineer's playground, Curr. Opin. Chem. Eng. 1 (3) (2012) 303–311.
[15] H.E. Ling, Y.U. Xiu-Min, L.I. Guo-Liang, X.U. Nan, Dynamic response of a threeway catalytic converter, Int. Conf. Future Electr. Power Energy Syst., Energy Proc. 17 (2012) 547–554.
[16] K. Kumar, V. Vijayan, B. Suresh Kumar, C.M. Vivek, S. Dinesh, Computational analysis and optimization of spiral plate heat exchanger, J. Appl. Fluid Mech. 11 (2018) 121–128