Design a Multi-functional Smart Chimney to Eliminate the Byproducts of Combustion Processes and Reduce Global Warming by Using Innovative Technologies

Alhajri, Nada (School: The Third High School in Abha)

The government of the Kingdom of Saudi Arabia attaches great importance to citizen's health and is concerned with the environment and its preservation. These goals have been outlined in its current program, Vision 2030. The World Health Organization (WHO) has reported that 90% of the world's deaths are caused by pollutants emitted from industrial sectors, as well as from polluting cooking stoves. The increase in industrial activity leads to an increase in pollutants in hydrocarbons resulting from the incomplete combustion of fuels. The idea of this novel research focuses on the design of a smart chimney that includes several stages of processors to eliminate harmful gases by means of an intelligent design that includes three treatment areas. These are photocatalysis, adsorption and electrocoagulation. In the photocatalytic unit, some photocatalysts were used to break down the hydrocarbon gases and then adsorb the products through the adsorption unit. In the electrocoagulation unit, the process was implemented to eliminate the fine carbon particles. Carbon monoxide and carbon dioxide output was measured by taking a sample of silver-plated carbon, used in the adsorption unit, and determined via an infrared spectrometer. The output shows water, methane, carbon monoxide and carbon dioxide. An adsorption resulted at two peaks, 2350sm in the first and a second in the range of 2200-2100sm. This project successfully tested the use of the smart chimney with three successive stages that enable the treatment of polluted fumes, which has the potential to provide future environmental benefits.

Awards Won: