

Analysis of temperature rise in a car parked under sunlight, its effects and possible solutions

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Abstract

Thermal comfort is one among the factors that affects the driving experience. Several infants/children death reported across the globe after left in the parked car and high temperature may create heat stroke. The aim of the project is to determine the temperature variation inside the car cabin under direct sunlight and to reduce it. When a vehicle is parked under the direct sunlight, the accumulated heat is affecting many interiors inside the vehicle cabin, such as plastic and fibres including piano black plastic, faux carbon fibre and hard black plastic of the dashboard, the leather covers and the electronic components. Vehicle interior is a specific environment of smaller volume, with a large variety of materials placed inside, including hard and soft plastics, adhesives, paints, lubricants and many others. As a result, particularly in case of new vehicles, large amounts of volatile species, especially volatile organic compounds like Benzene are emitted. The normal benzene content is 50 ml/sqft which is not harmful to us. The temperature levels in the cabin of the vehicle can be more than 20 °C above the ambient temperature (almost 60 °C). In a closed car parked under sunlight, the benzene content varies from 2000 to 4000 ml/sqft (40 times greater). Many of these compounds are harmful for human health and toxic, this is the reason for increasing concern of vehicle manufacturers and users recently. The project is mainly carried out in three steps. Partially insulating the heat entering through the metal body, providing a pop-up layer of insulation material to reduce the heat through the glasses, protect the dash-board from the exposure to higher temperatures using wooden skin. The air inside the cabin can also be conditioned. The temperature inside a parked car could be brought from 62 °C to 32 °C using Cross Linked Polyethylene Sheets (XLPE Sheets) during our experiment. The contamination level varies with different vehicles and may be influenced by atmospheric conditions, external pollution, colour of the vehicle, quality of materials used and others. The main aim of our project is to present current knowledge status on the temperature rise and the measurement, analysis, also the indication of main air pollutants and their concentrations. A car (or automobile) is a

wheeled motor vehicle used for transportation mainly people rather than goods. 20th century marked the use of cars in global level, and developed economies depend on them. The year 1886 is regarded as the birth year of the modern car when German inventor Karl Benz patented his Benz Patent-Motorwagen. Cars were available widely by the early 20th century. The first cars that were accessible to the people was the 1908 Model T, manufactured by the Ford Motor Company. Cars have got many utilities such as controls for driving, parking, passenger comfort and safety, and controlling a variety of lights. Additional features and controls have been added to vehicles, making them progressively more complex. Such as rear reversing cameras, air conditioning, navigation systems, and in car entertainment. Among these air condition and cabin comfort are the most predominant feature and utility that make a person to buy a car. This is much clearer at the government offices, universities, and shopping areas. Moreover, the available shaded parking areas do not match the existing numbers of vehicles; hence the alternative choice for those who are unable to park under shaded area is to park in an open parking space. Parking under direct sunlight gave rise of greenhouse problem. Which is the conversion of solar radiation entering through the windows of a car into long wave thermal radiation and trapped inside car cabin causes rise in temperature of cabin components. Temperature inside the vehicle cabin is very important to provide comfortness to the passenger. The temperature can be controlled by using air conditioning system that can be operated when the car engine is in operation. However, when the car is left or parked directly under the sunlight, temperature inside the cabin will be increased. Sealed automobiles increases interior temperature conditions that are tremendously uncomfortable to the passengers. Here in this paper we are going to discuss about the temperature rise that occurs in a car parked under sunlight, harmful gases liberated from the cabin when exposed to higher temperatures, its effects and solution to solve this problem.