Chapter 26: Liquid & Gaseous Fuels

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Abstract

The chapter deals with liquids and gaseous fuels, their composition, properties, uses and their effect on the environment. Liquid fuels e.g. petrol, diesel, and kerosene are mostly hydrocarbons which are the result of crude oil refining. Domestic, transportation, and industrial energy requirements are met with gaseous fuels such as the LPG (liquefied petroleum gas) and CNG (compressed natural gas). The chapter describes the properties of fuels including calorific value, octane number to petrol, cetane number to diesel, flash point, and volatility, which determine performance, efficiency as well as safety. Apple and practical uses are also described, such as internal combustion engines, power generation, and heating systems. Environmental factors, which include the emission of CO_2, NO, SO_2, and PM, are examined including the methods of cutting down on pollution in terms of fuel blending, catalytic converters and the use of alternative fuels. The chapter is a combination of chemical concepts and energy efficiency, optimization of combustion and industry, which gives the general view of fuel behavior in a comprehensive manner. Students acquire skills needed in designing energy, automotive technology, environmental management and industrial fuel applications that connect chemicals characteristics and actually real world applications in energy solutions.

Keywords: Liquid fuels, Gaseous fuels, Petrol, Diesel, LPG, CNG, Octane number.

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26.1.Introduction

The fuels are materials which in case of exposure to the process of combustion sell usable energy which is utilized in the transport sector, generation of power, domestic consumption and most industries. Since the time when the human civilisation appeared, fuels took the centre of the development of the society. The wood and charcoal were initially solid fuels that were initially used to cook, heat and extract metals. At the time when the Industrial Revolution occurred in the 18th and 19th centuries, coal was the most valued source of power and the steam engines, factories and railways were run using coal coal as power source. This occurred as a massive alteration in the late 19th and early 20th century in which liquid fuels like petrol, diesel and kerosene became universal because of the discovery and purification of petroleum. These fuels were more powerful, possessed a stronger handling and an appropriate adjustability to internal combustion engine and reshaped transport and industrial machines. In the meantime gaseous fuels including coal gas and subsequently natural gas were also of value as they were less polluting in combustion and their flame qualities could be manipulated. Less emissive and efficient natural gases could be LPG, CNG, natural gas, and hydrogen as they are the more popular today. The nature of a fuel is very crucial in dictating the environmental impact and environmental performance in fuels. Calorific value is known to ascertain the quantity of energy that is emitted and volatility estimates ignition and combustion properties. The most important parameters of petrol and diesel engines respectively are the octane number and cetane number which determine the efficiency of the engine and the knocking tendency, as well as the fuel economy. Therefore, the nature of fuels and their specifics should be

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