Questions

(8.1) A diesel fuel when tested has the same ignition characteristics as the mixture of 40% n- cetane and 60% hepta-methyl nonane. What is its cetane number? The fuel at 15º C has density of 825 kg/m^3 and mid-boiling point (T_{50}) of 240º C. Find the calculated cetane index of the fuel. How much error results in using CCI instead of CN?

(8.2) What are the changes in volumetric efficiency for a gasoline (C_8H_{15}) engine when it is converted -by retro- fitment for operation on methane or hydrogen? Assume inlet conditions as 1 bar, 298 K and the engine size and geometry remain unchanged. Gasoline also enters the engine cylinder mostly as liquid.

(8.3) Calculate energy content of 1 m^3 of stoichiometric mixtures with air of gasoline (C_8H_{15}), ethyl alcohol, methanol and hydrogen. Compare your results with those in Table 8. 13. Take standard conditions of 1 atmosphere (101 kPa) and 298K.

(8.4) Rate the fuels methane, ethanol, gasoline, high aromatic gasoline, and diesel in terms of their potential to produce NO emissions based on adiabatic flame temperature data.

(8.5) Calculate mass of CO_2 per MJ of energy for gasoline, diesel, propane and ethanol when burned as stoichiometric mixtures. Check your results with the data given in Table 8.13.

(8.6) Find the contribution of 0.1% sulphur in fuel to PM as percentage of Euro 1 to Euro 4 heavy duty PM emission limits.

(8.7) Discuss why Supreme Court of India could have ordered replacement of all the diesel buses by CNG buses in early 2003? How the CNG buses could meet those goals?