Calculation of some Thermodynamic Properties Based on Isochoric Specific Heat and *PvTx* Relationship for Jojoba Bio-Gasoline as Renewable Fuel

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This research studies the thermodynamic properties such as isobaric specific heat (C_p), internal energy (u), enthalpy (h), Joule Thomson Coefficient (μ_{JT}), and volume compressibility coefficient (β_T) based on isochoric specific heat (C_v), pressure, specific volume, temperature and concentration (*PvTx* data) for {(x) Jojoba Bio-Gasoline + (1-x) Gasoline} mixture. Properties were measured in the temperature range from 295K to 345 K, pressure up to 7 MPa, and the concentration ranged from 0 % to 100 %. The experiments have been carried out at concentrations of Jojoba Bio-Gasoline of (0 %, 20 %, 40 %, 60 %, and 100 %) by mass. These thermodynamic properties were correlated as $C_p=f(T,p,x)$, $u=f(T,v,x)$ and $h=f(T,p,x)$. The isobaric specific heat for Jojoba Bio-Gasoline is increased by about 30 % from commercial gasoline. Joule Thomson coefficient (μ_{JT}) and coefficient of isothermal compressibility (β_T) are plotted in figures. The percentage deviations values were found to be (±3 %) through the experimental results. The results show small effects for Joule Thomson coefficient. The coefficient of volume compressibility values determined for Jojoba Bio-Gasoline was found to be as twice as much for commercial gasoline. This will enable the designer to design the fuel tank to keep it safe. These thermodynamic properties are very important to enable the designer to modify the ducts of the inlet mixture for conventional spark ignition engines to be modified. This is required for a suitable starting up and steady operations of the engine.