

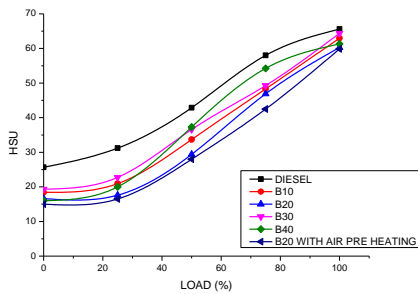






**Smoke Density (H.S.U):**

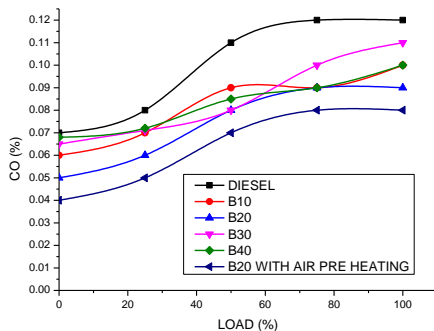
The variation of smoke density with load is shown in figure. The plot it is reveals that as the load increases smoke density decreases . The smoke density of palmyra oil Kusum oil blend B20 and the B20 blend with air pre heating slightly decreased when compared to the diesel at full load condition



**Graph 7:** Smoke Density vs Load

**CARBON MONOXIDE (CO):**

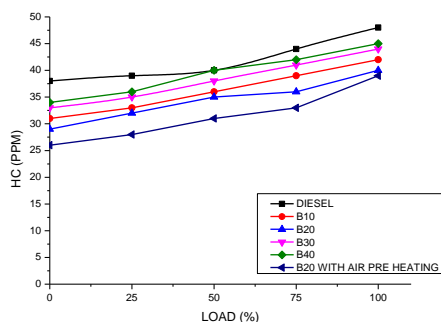
The variation of carbon monoxide with load is shown in figure. The plot it is reveals that as the load increases carbon monoxide decreases .. The carbon monoxide of Kusum oil blend B20 and the B20 blend with air pre heating slightly decreased when compared to the diesel at full load condition.



**Graph 8:** Carbon Monoxide vs Load

**HYDRO CARBONS (HC):**

The variation of hydro carbons with load is shown in figure. The plot it is reveals that as the load increases hydro carbons decreases . The hydro carbons of Kusum oil blend B20 and the B20 blend with air pre heating slightly decreased when compared to the diesel at full load condition.

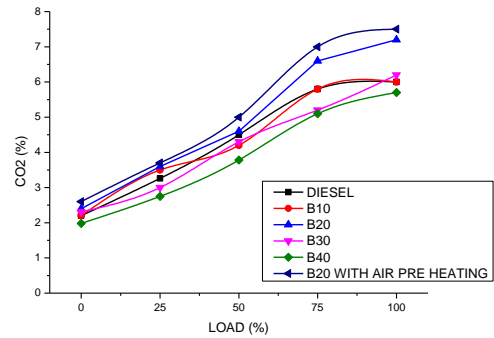


**Graph 9:** Hydro Carbons vs Load

**CARBON DIOXIDE (CO2):**

The variation of carbon dioxide with load is shown in figure. The plot it is reveals that as the load increases carbon dioxide decreases . The carbon dioxide of Kusum oil blend

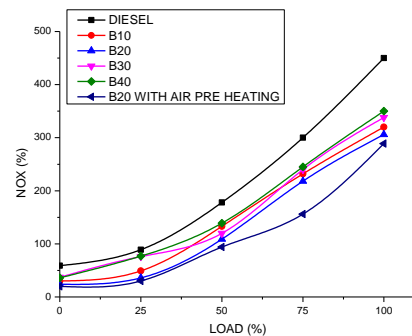
B20 and the B20 blend with air pre heating slightly decreased when compared to the diesel at full load condition



**Graph 10:** Carbon Dioxide vs Load

**Nitrogen Oxide (NOx):**

The variation of NOx with load is shown in figure. The plot it is reveals that as the load increases NOx decreases . The NOx of Kusum oil blend B20 and the B20 blend with air pre heating slightly decreased when compared to the diesel at full load condition.



**Graph: 11** Nitrogen Oxide vs Load

**7. Conclusion**

- The experiments are conducted on the four stroke single cylinder water cooled diesel engine at constant speed (1500rpm) with varying 0% to 100% loads with diesel and different blends of kusum oil like B10,B20 B30. and B40.
- The performance parameters such as  $\eta_{MECH}$ ,  $\eta_{BTE}$ ,  $\eta_{ITE}$ ,  $\eta_{VOL}$ , BSFC and ISFC were calculated from the observed parameters and shown in the graphs.
- The emissions characteristics such as carbon monoxide(CO),hydro carbons(HC), carbondioxide(CO<sub>2</sub>), oxygen(O<sub>2</sub>), nitrogen oxide (NO<sub>x</sub>), smoke density(H.S.U) are also decreased, will compared to diesel and other blends.
- It is observed that having 20% kusum oil blend and with air pre heating B20 blend with diesel CI engine gives energetic results for as performance parameters.
- And emissions characteristics also decreases will compared to diesel at 20% kusum oil blend with diesel.

**References**

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