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IMPORTANT PARAMETERS AND EXHAUST EMISSIONS OF FOUR STROKE CC SIE THROUGH A CONVERTER

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Abstract: *In this paper, the performance of 4 strokes single cylinder spark ignition engine with copper coated combustion chamber coated on piston crown, and inner aspect of cylinder head] with alcohol mixed hydrocarbon were investigated. Performance parameters like brake thermal potency, exhaust gas temperature and volumetrically potency at varied values of brake mean effective pressure of the engine and conjointly investigated the combustion characteristics reminiscent of peak pressure, most rate of pressure rise, time of incidence of peak pressure and most heat unleash at full load operation of the engine with alcohol mixed hydrocarbon. During this study, a comprehensive review of the four-stroke copper coated spark ignition engine victimization alcohol mixed hydrocarbon with the converter. The output power and emissions of alcohol mixed engines were compared with standard engines with pure hydrocarbon operation.*

Keywords: *standard Engine, Copper coated combustion chamber, Copper coated engine, converter.*

Introduction: The performance and pollution levels of four-stroke, single cylinder SIE with alcohol mixed having copper coated engine with converter and compared with standard SI engine with hydrocarbon operation were studied. Kumar et.al were dispensed work for reducing pollutants from copper-coated spark ignition engine fitted with converter containing sponge iron catalyst run with fuel. The influence of parameters reminiscent of flowing rate, void ratio, and temperature of injected air, compression quantitative relation, speed, load on the engine and emissions were studied. Murthy et.al worked on organic compound emissions from four-stroke, single cylinder SIE with fuel having CCE on piston crown and inner aspect of cylinder head given. As copper-coated engine in comparison with standard SI engine with hydrocarbon operation showed a reduction in organic compound emissions. Kishor et.al Experiments were conducted to manage the exhaust emissions from four-stroke, variable speed, variable compression quantitative relation, single cylinder, SI engine, with alcohol mixed hydrocarbon having copper coated combustion chamber given converter compared with standard SI engine with pure hydrocarbon operation. Investigations were dispensed to gauge the performance of 4 stroke, variable speed, variable compression quantitative relation single cylinder spark ignition (SI) engine with alcohol mixed having copper coated combustion chamber coated on the piston crown and inner aspect of plate by Kishor et.al. Investigations were dispensed by Priyadarshini et.al, to gauge the performance of variable speed, variable compression quantitative relation, four- stroke, single cylinder, spark ignition engine having copper coated engine coated on piston crown and inner aspect of plate given converter with completely different check fuels of pure hydrocarbon, fuel (80% hydrocarbon and 2 hundredth grain alcohol by vol.) and alcohol mixed hydrocarbon (80% hydrocarbon and 2 hundredth alcohol by vol.) and compared with standard engine with pure hydrocarbon operation. Experimental Investigations were conducted by Murali Krishna et.al, for measure and management of the organic compound emissions from a variable-compression quantitative relation, variable-speed, copper-coated SI engine burning with grain alcohol mixed hydrocarbon (20% V/V) and alcohol mixed hydrocarbon fitted with chemical process converter.

Review: an oversized variety of experimental studies are dispensed on four-stroke copper coated spark ignition engines fuelled with alcohol mixed hydrocarbon. In many, however, not all, cases the operational constraints i.e. air-fuel quantitative relation and peak conditions are maintained constant in each the alcohol mixed gasoline-fuelled engine and standard fuelled gasoline engine. Investigations that are dispensed at same operational conditions indicate acceptable performance characteristics reminiscent of fuel consumption, thermal potency, Exhaust gas temperature, volumetrically potency and an overall reduction in emissions in alcohol mixed hydrocarbon engines. Some experimental investigations have indicated virtually no improvement in thermal potency and claim that exhaust emissions deteriorated as compared to those of the standard diesel motor.

Methods: This section deals with fabrication of copper coated combustion chamber, description of experimental started, operational conditions of converter and definition of used values. In chemical process coated combustion chamber, the crown of the piston and inner surface of the plate are coated with copper by the flame applicator. The surface of the parts to be coated are cleaned and subjected to sandblasting. A bond coating of nickel-cobalt-chromium of thickness one hundred microns is sprayed over that copper (89.5%), metal (9.5%) and iron (1%) alloy of thickness 300microns are coated with METCO flame applicator. The coating has the terribly high bond strength and doesn't wear off even once fifty h of operation. Fig.1. shows a schematic diagram of the experimental set-up used for

investigations. A four-stroke, single-cylinder, cool, SI engine was coupled to Associate in a Nursing eddy current measuring system for measurement brake power. Compression quantitative relation of the engine was varied with the amendment of clearance volume by adjustment of the plate, rib to a cylinder of the engine. Engine speeds are varied from 2400 to 3000 rev. Exhaust gas temperature is measured with iron-constantan thermocouples. Fuel consumption of engine was measured with measuring system methodology, whereas air consumption was measured with air-box methodology. The bore of the cylinder was seventy metric linear units whereas stroke of the piston was sixty-six metric linear units. The engine oil was given a mechanical system. No temperature management was incorporated, for measurement the lubricating oil temperature. Suggested spark ignition temporal arrangement was 25TDC. The CO and UBHC emissions in engine exhaust were measured with Netel Chromatograph analyzer.

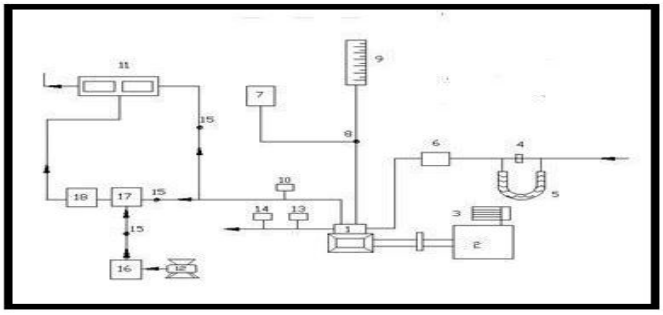

Fig .1 Schematic Diagram of Experimental set up

- ✓ Engine
- ✓ Eddy current dynamometer
- ✓ Loading
- ✓ Arrangement
- ✓ Orifice meter
- ✓ U-tube water monometer
- ✓ Air box
- ✓ Fuel tank
- ✓ Three-way valve
- ✓ Burette,
- ✓ Exhaust gas temperature indicator,
- ✓ CO-analyzer,
- ✓ Air compressor,
- ✓ Outlet jacket water temperature indicator,
- ✓ Outlet jacket water flow meter,
- ✓ Directional valve,
- ✓ Rota meter,
- ✓ Air chamber
- ✓ Catalyst chamber

A converter (Fig.2) was fitted at the finish of the pipe of the engine. A provision was conjointly created to inject an explicit amount of air into a converter. Air amount drawn from the mechanical device and injected into the device was unbroken constant in order that back pressure doesn't increase. Experiments were dole out on metal and copper coated combustion chamber with completely different check fuels beneath completely different in operation conditions of converter like set-A, while not convertor and while not air injection; set-B, with converter and while not air injection; and Set-C, with converter and with air injection. Air-fuel magnitude relation is varied thus on acquire completely different equivalence ratios. For activity aldehydes within the exhaust of the engine, a wet chemical methodology is used. The exhaust of the engine is bubbled through a pair of, 4-dinitrophenyl reluctant in the acid answer and also the hydrazones fashioned from aldehydes are extracted into chloroform and are analyzed by high-performance liquid activity (HPLC) to search out the proportion concentration of methanol and aldehyde within the exhaust of the engine.

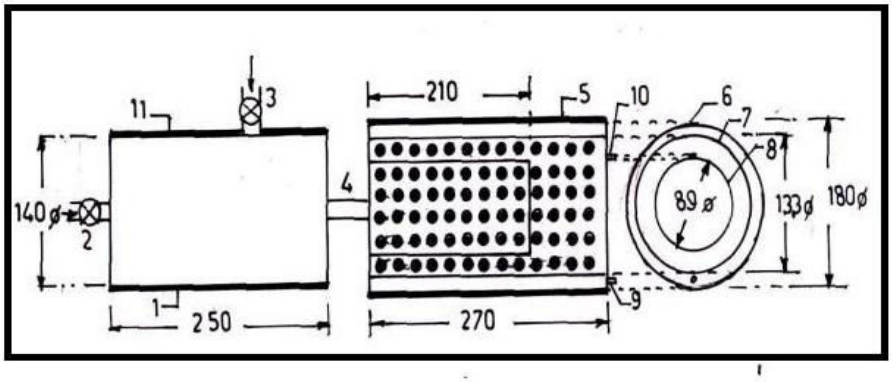

Fig. 2 Converter

- ✓ Air chamber
- ✓ Inlet for air chamber from the engine
- ✓ Inlet for air chamber from compressor
- ✓ Outlet for air chamber
- ✓ Catalyst chamber
- ✓ Outer cylinder
- ✓ Intermediate cylinder
- ✓ Inner cylinder
- ✓ Outlet for exhaust gases

Results: The variation of CO emissions in the exhaust of the engine at the peak load operation of the engine at a speed of 3000 rpm with a compression ratio of 9:1 with varying void ratio of the catalyst for different configurations of the engine with different test fuels is shown in Fig 3. The variation of CO emissions with amount of injected air at peak load operation for gasohol and gasoline at a speed of 3000 rpm with different versions of the engine at a compression ratio of 9: 1 is shown in Figure 4.

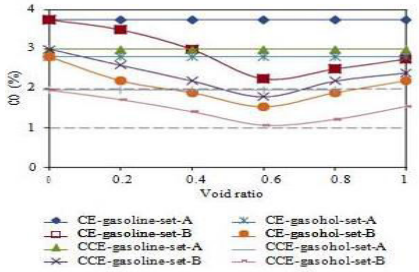

FIGURE 3

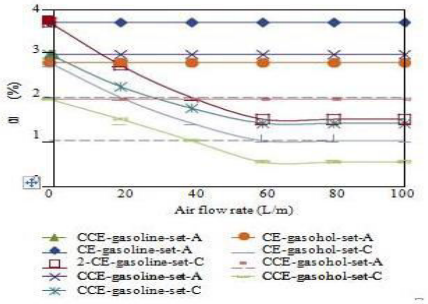

FIGURE 4

The variation if CO emissions with temperature of injected air at peak load at peak load at compression ratio of 9:1 and speed of 3000 rpm for different test fuels of gasoline, gasoline with different versions of the engine at different operating conditions of the Converter.[2]

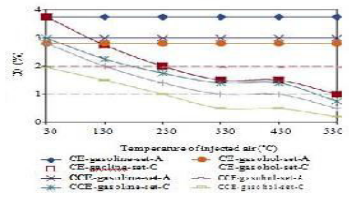

FIGURE 5

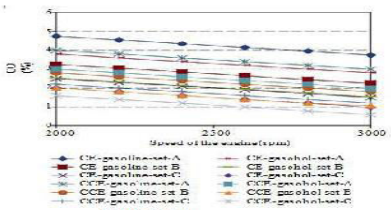

FIGURE 6

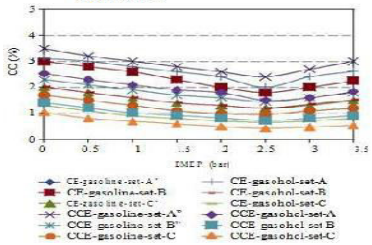

FIGURE 7

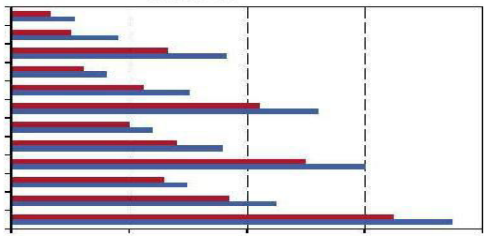

FIGURE 8

Fig.5: Different configurations of the engine with different test fuels.
Fig.6: Different configuration of the engine with different test fuels under different operating conditions of the Converter.
Fig.7: Different configurations of the engine with different test fuels under different operating conditions of the Converter.
Fig.8: Different compression ratios at speed of 3000 rpm and void ratio of 0.7:1.

Table 1: Different configurations of the engine at different operating conditions of the converter

Set	Concentration (vol %)			
	Conventional engine		Copper coated engine	
	Pure gasoline	Gasoline	Pure Gasoline	Gasoline
Set-A	6.5	12	4.5	9.0
Set-B	4.5	5.6	2.5	5.1
Set-C	2.5	4.8	1.5	3.4

Table 2 Different configurations of four-stroke spark ignition engine in comparison with pure gasoline operation on conventional engine at different operating conditions of the converter

Set	Formaldehyde emissions (vol %)			
	Conventional engine		Copper Coated Engine	
	Pure gasoline	Gasoline	Pure gasoline	Gasoline
Set-A	-	+84%	-30%	+38%
Set-B	-30%	-14%	-61%	-21%
Set-B	-61%	-26%	-77%	-47%

Table 3: Different configurations of the engine at different operating conditions of the converter

Set	Concentration (vol %)			
	Conventional engine		Copper Coated Engine	
	Pure gasoline	Gasoline	Pure gasoline	Gasoline
Set-A	5.5	10.45	3.5	6.6
Set-B	3.5	4.7	2.5	3.1
Set-B	1.5	3.7	1.0	2.3

Table 4: Different configurations of four-stroke SIE in comparison with pure gasoline operation on conventional engine

Set	Conventional engine		Copper Coated Engine	
	Pure gasoline	Gasoline	Pure gasoline	Gasoline
Set-A	-	+90%	-36%	+20%
Set-B	-36%	-14%	-54%	-38%
Set-B	-72%	-32	-82%	-58%

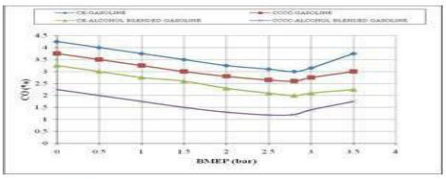

FIGURE 9

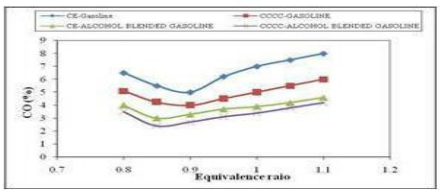

FIGURE 10

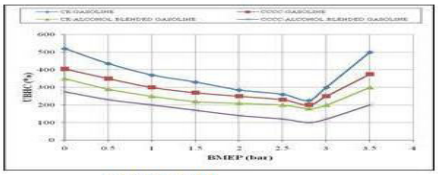

FIGURE 11

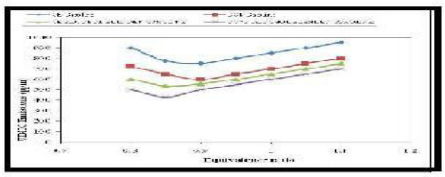

FIGURE 12

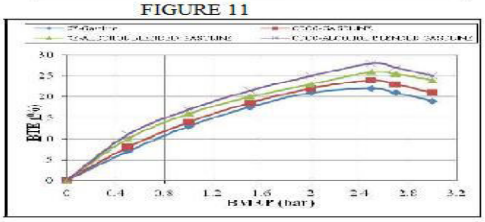

FIGURE 13

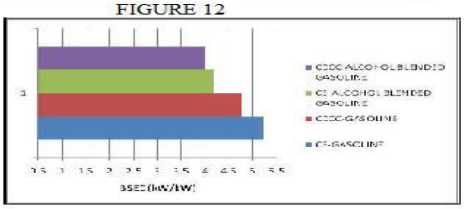

FIGURE 14

Fig 9: Different versions of the combustion chamber with pure gasoline and alcohol blended gasoline at a compression ratio of 7.5:1 and speed of 3000 rpm.
Fig.10: Different versions of the combustion chamber with pure gasoline and alcohol blended gasoline at a compression ratio of 7.5:1 and speed of 3000 rpm.
Fig.11: Different versions of the combustion chamber with pure gasoline and alcohol blended gasoline at a compression ratio of 7.5:1 and speed of 3000 rpm.
Fig.12: Different test fuels with a compression ratio of 7.5:1 at a speed of 3000 rpm.
Fig.13: Different versions of the engine with test fuels at a compression ratio of 9:1 and speed of 3000 rpm.
Fig.14: Different versions of the combustion chamber with test fuels at a compression ratio of 9:1.

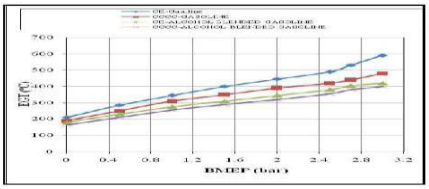

FIGURE 15

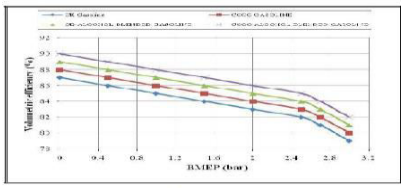

FIGURE 16

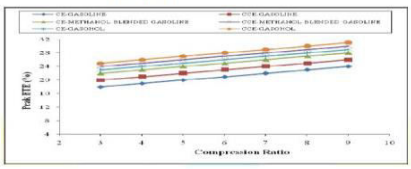

FIGURE 17

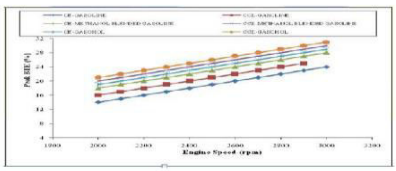

FIGURE 18

Fig.15: Different versions of the combustion chamber with test fuels at a compression ratio of 9:1 and speed of 3000 rpm

Fig.16: Both versions of the engine with test fuels at a speed of 3000 rpm.

Fig.17: Both version of the engine with test fuels at speed of 3000 rpm.

Fig.18: Both version of the engine with test fuels at compression ratio of 9:1

Conclusion: The objectives of performance, fuel economy and reduced emissions of mistreatment alcohol blending fuel in SI engines are gettable, however a lot of investigations underneath correct operative constraints with improved engine style. supported the reviewed literature for the performance and Exhaust emissions of 4 stroke copper coated spark ignition engine with alcohol blending fuel with a device, therefore a variety of conclusions are drawn from the studies of varied experimental investigations, These are follows

- ✓ Pollutants diminished by 25-45% with the modification of fuel from fuel to alcohol blending with fuel in each version of the engine underneath completely different operative conditions of the device.
- ✓ CO/UBHC emissions at peak load diminished by 25-45% with the modification of engine configuration from a standard engine to copper coated SI engine with a device.
- ✓ In four stroke engine, methanol emissions diminished by 45-68% with completely different sets of operation with pure fuel on a standard engine and compared with copper coated spark ignition engine with the device running on alcohol blending fuel.
- ✓ In four stroke engine, ethanol emissions diminished by 45-77% with completely different sets of operations with pure fuel on convention engine and compared with copper coated spark ignition engine with a device running on alcohol blending fuel.
- ✓ CO and UBHC emissions diminished by 2 hundredths with the copper coated engine when put next with standard engine with each check fuels.
- ✓ Exhaust gas temperature diminished with fuel operation when put next with copper coated engine.
- ✓ Volumetric efficiencies were compatible with fuel in addition as alcohol blending with fuel.
- ✓ Thermal potency decreases with alcohol blending fuel with the copper coated engine and exhaust gas temperature diminished with fuel with check fuels.
- ✓ Exhaust emissions diminished with alcohol blending fuel when put next with fuel testing underneath completely different operative conditions with different sets.

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