Cover of Cylinder Lattice Plastic Convert into Fuel

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ABSTRACT

Waste plastic of cylinder lattice to liquid fuel production process was performing two step processes. 1st step process was perform muffle furnace with ceramic crucible and 2nd step process was perform glass reactor with condensation unit. Thermal degradation process was performing with furnace and temperature was 410 ℃ and reactor temperature was 420 ℃. Muffle furnace was use for solid hard shape of plastic melting purpose and glass reactor was use for liquid slurry to produce vapor purpose. Liquid slurry to produce vapor was condensed and collected liquid fuel and fuel density is 0.75 g/ml. Liquid fuel production conversation rate was 71.05 %. Fuel was analysis by GC/MS and carbon chains obtain C_3 to C_{23} from GC/MS chromatogram. Fuel color is light yellow and fuel is ignited.

Keywords: plastic lattice, conversion, fuel, hydrocarbon, waste plastic, GC/MS

1. INTRODUCTION

Every year large amounts of mixed plastic waste (MPW), mainly consisting of polyethylene (PE), polypropylene (PP), polystyrene (PS), and poly (vinyl chloride), (PVC) are produced. At the moment this waste is usually dumped or incinerated together with household waste, but due to environmental concerns, governments, companies, and universities are looking at alternatives for the disposal of this waste. One very promising alternative to dumping or incineration is high-temperature pyrolysis of the MPW to recover valuable chemicals, like ethene, propene, and styrene [1]. Recently, plastics recycling has received much attention all over the world because of serious environmental problems caused by waste plastics as well as their potential for use as resources. Landfill and incineration have not gained social acceptance as the methods for disposing of the waste, and they are becoming legally restricted because of strong pollution concerns. A chemical method that converts waste plastics into chemical resources or fuels is of great interest as an alternative because it provides a viable means of contributing to solution of the problems [2].

Degradable polyolefins have a long history. During the 1970s, a number of products based on polyethylene were commercialized. It was recognized at that time that polyolefins as

produced were oxidatively unstable in the environment, and early investigations showed that the reason for their instability was the presence of sensitizing impurities in the polymer [3- 6].

The most important of these were carbonyl ($>C=O$) [3, 5, 6] and hydroperoxide groups (-OOH) [3, 7-10] formed during manufacture of plastics products. This led to extensive studies in the polymer industries and later in universities directed toward extending the lifetime of polymers by using heat and light stabilizers [7-14]. By contrast, the polyolefins had already achieved a central position in the distribution of consumer goods because of their combination of flexibility, toughness, and excellent barrier properties, which has made them the materials of choice for packaging applications [15]. They were particularly important in blown film technology and injection molding because of their ease of conversion and low cost. The present day efficient distribution of perishable foodstuffs is a direct consequence of the resistance of the polyolefins and other carbon-chain polymers to water and water-borne microorganisms [16], and in agriculture, the new technology of plasticulture based on polyethylene was already making an impact on the growing of soft fruits and vegetables [17, 18, 19, 20].

The various methods of plastic waste recycling [21], thermal and/or catalytic degradation of plastic waste to gas and liquid products are the most promising to be developed into a commercial polymer recycling process.

The products of such a process could be utilized as fuels or chemicals. These way waste plastics could be regarded as a cheap source of material. Because pure thermal degradation demands relatively high temperatures and its products require further processing for their quality to be upgraded, catalytic degradation of plastic waste offers considerable advantages [21-31].

There has been considerable work conducted on pyrolysis of polymers, some of which aimed at pyrolytic recycling of plastics to monomers and fuels. Thermal conversion of plastics, both pyrolysis and gasification, has been extensively studied, and commercial processes have been developed [32, 33] to convert waste plastics to fuels. However, very few works focused on hydrogen as the main product from waste plastics [34]. studied a fluidized bed co-gasification of coal, biomass, and plastics to generate hydrogen-rich gas [35]. Patented a process for manufacturing synthesis gas from petroleum residues and waste plastics. Recently [36, 37], reported on catalytic steam reforming of oils produced by pyrolysis of plastics at 350-400 °C.

2. MATERIALS AND METHOD

Waste material cover of cylinder lattice was collected from helium gas cylinder and it was hard transparent. When helium gas was order for laboratory that time it was coming with helium gas cylinder as a cover. Usually this cover was throughout as a waste plastic. Cover of cylinder lattice was cut into small pieces and small pieces cylinder lattice was placed into crucible for muffle furnace. Muffle furnace provided company was Barnstead International and model F 6000. Full muffle furnace placed was Labconco fume hood and model number is 6910110. Muffle furnace temperature capable up to 1400 ºC, but out program temperature was 430 ºC and temperature ramping rate was 20 ºC per minute. Waste plastic and crucible was placed into muffle furnace inside and covered the muffle furnace door.

Total solid sample was 250.8 gm. Then start the muffle furnace for solid plastic to melt at 410 ºC for 21 minutes. When temperature was researched at 410 ºC then temperature was hold for 20 minutes. After 20 minutes running muffle furnace temperature goes down 5 ºC per

minute. When temperature was down 150 ºC then muffle furnace door was open and took out crucible with crucible cover and placed into fume hood inside. Then liquid slurry was placed into glass reactor inside from crucible. During this process solid sample was liquid and some solid sample was vapor and come out outside.
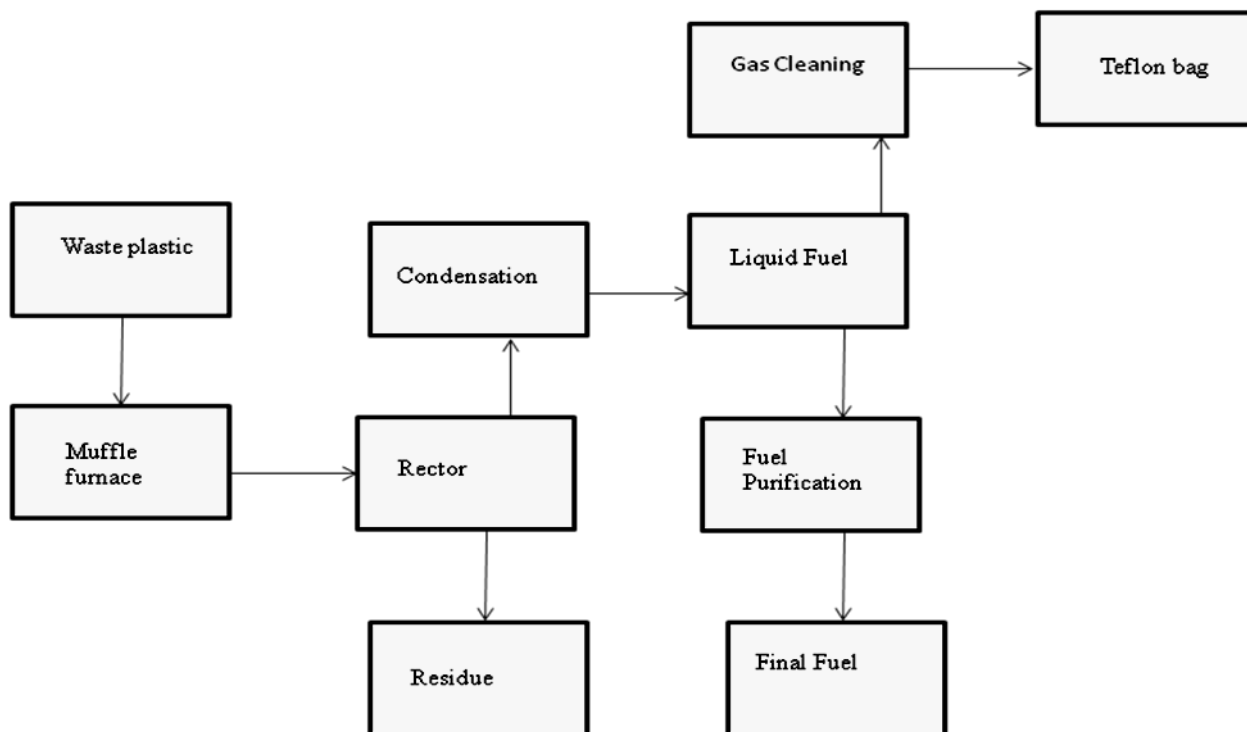

Figure 1. Cover of cylinder lattice to fuel production process step.

Fume hood Hepa filter was absorbed produce vapor because condensation was not setup with muffle furnace. Our experimental main goal was cylinder lattice to fuel production process with muffle furnace through glass reactor. During this process none of smoke or vapor did not come outside and all vapors was absorbed by fume hood filter. Muffle furnace liquefaction process solid sample to liquid slurry period produce vapor percentage was 7.53% (18.9 gm). This process was 1st step process and 2nd step process was liquid slurry to produce liquid hydrocarbon fuel (Figure 1). When liquid waste plastic slurry transfer into glass reactor inside manually and liquid slurry weight was 231.9 gm, then glass reactor was heated up to 420 ºC and temperature was monitored by variac meter. Condensation was setup with reactor but cooling water did not use as a condensation process. Room temperature was enough for produce vapor condensation purpose. Waste plastic liquid slurry was heated up continually until finish the full slurry to produce vapor and collected liquid fuel. Liquid slurry to fuel production period also light gas was generated and light gas was treated with alkali solution to remove contamination.

Fuel was cleaned with micron filter and clean fuel keeps into separate container for future use or analysis. Liquid fuel was recovering 178.2 gm (volume 235 ml), left over residue was 25 gm, light gas was generated from sample 15 gm, and 13.7 gm was stuck with crucible inside surface. Liquid fuel recover percentage was 71.05 %. Cover of cylinder lattice was non coded waste plastic and produce residue was solid hard and black color. Product fuel

color is light yellow and fuel is ignited. Product fuel density is 0.75 g/ml. After finished the experiment solid black residue take out form glass reactor and keep for separate container.

3. RESULTS AND DISCUSSION
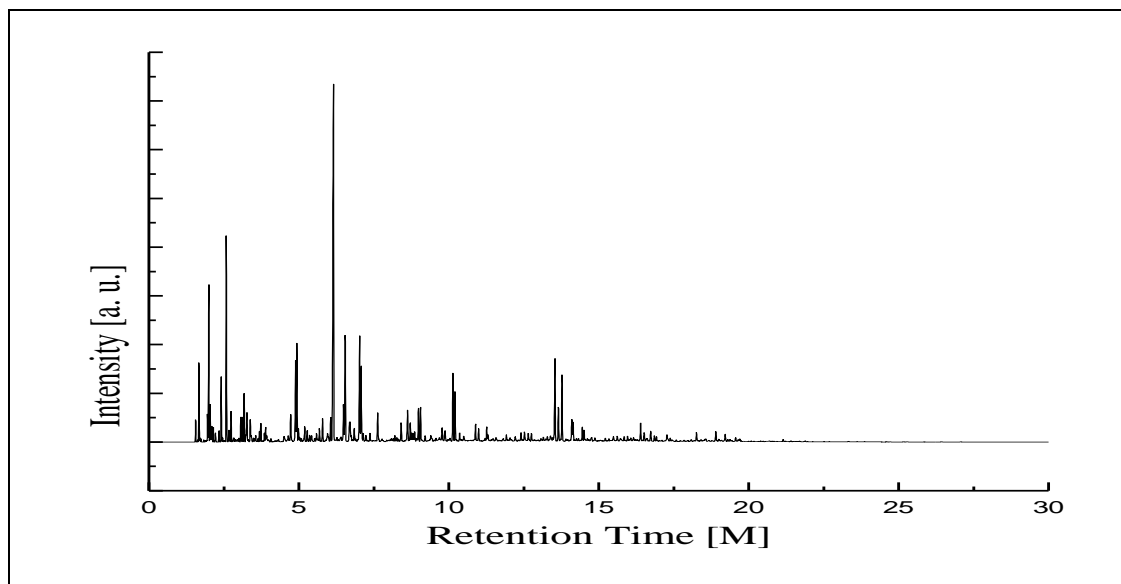
Figure 2. GC/MS chromatogram of cover of cylinder lattice to fuel.

Table 1. GC/MS chromatogram compounds list of cover of cylinder lattice to fuel.

Number of Peak	Retention Time (min.)	Trace Mass (m/z)	Compound Name	Compound Formula	Molecular Weight	Probability %	NIST Library Number
1	1.56	41	Cyclopropane	C_3H_6	42	50.1	18854
2	1.66	41	2-methyl-propene	C_4H_8	56	33.9	18910
3	1.95	42	ethyl-cyclopropane	C_5H_{10}	70	21.7	114410
4	2.00	43	pentane	C_5H_{12}	72	79.0	114462
5	2.04	55	*trans*-1,2-dimethyl-cyclopropane	C_5H_{10}	70	13.5	114453
6	2.08	55	*cis*-1,2-dimethyl-cyclopropane,	C_5H_{10}	70	19.0	248

7	2.10	55	(E)-2-pentene	C_5H_{10}	70	17.3	291780
8	2.15	67	1,3-pentadiene	C_5H_8	68	17.3	291890
9	2.22	67	(Z)-1,3-pentadiene	C_5H_8	68	15.5	211
10	2.34	41	1-Pentene, 4-methyl-	C_6H_{12}	84	17.2	149350
11	2.41	43	Pentane, 2-methyl-	C_6H_{14}	86	65.0	61279
12	2.58	56	1-Pentene, 2-methyl-	C_6H_{12}	84	33.9	495
13	2.67	57	Hexane	C_6H_{14}	86	76.6	61280
14	2.74	41	2-Butene, 2,3-dimethyl-	C_6H_{12}	84	16.0	289588
15	3.06	67	2,4-Hexadiene, (Z,Z)-	C_6H_{10}	82	12.6	113646
16	3.17	56	1-Pentene, 2,4-dimethyl-	C_7H_{14}	98	64.0	114435
17	3.27	81	2,4-Dimethyl 1,4-pentadiene	C_7H_{12}	96	44.8	114468
18	3.38	78	Benzene	C_6H_6	78	69.9	114388
19	3.56	81	1,5-Hexadiene, 2-methyl-	C_7H_{12}	96	48.3	114394
20	3.69	56	1-Hexene, 2-methyl-	C_7H_{14}	98	42.5	114433
21	3.73	41	1-Heptene	C_7H_{14}	98	34.4	107734
22	3.85	43	Heptane	C_7H_{16}	100	46.1	61276
23	3.89	81	1,3-Pentadiene, 2,4-dimethyl-	C_7H_{12}	96	19.8	114450

24	3.93	81	Cyclopentene, 4,4-dimethyl-	C_7H_{12}	96	12.8	38642
25	4.07	81	Cyclopropane, 1,1,2-trimethyl-3-methylene-	C_7H_{12}	96	9.54	63085
26	4.13	79	1,3-Cyclopentadiene, 5,5-dimethyl-	C_7H_{10}	94	28.6	161866
27	4.21	67	1-Ethylcyclopentene	C_7H_{12}	96	36.6	114407
28	4.28	67	Cyclopropane, 1-(1,1-dimethylethyl)-2-methylene-	C_8H_{14}	110	4.16	62490
29	4.32	81	1-Ethyl-5-methylcyclopentene	C_8H_{14}	110	8.36	114420
30	4.42	41	Cyclopentane, ethyl-	C_7H_{14}	98	10.7	940
31	4.51	79	2,4-Heptadien-1-ol, (E,E)-	$C_7H_{12}O$	112	31.1	1645
32	4.64	56	2,4-Dimethyl-1-hexene	C_8H_{16}	112	47.1	113443
33	4.73	69	2-Hexene, 3,5-dimethyl-	C_8H_{16}	112	11.9	149385
34	4.89	43	Heptane, 4-methyl-	C_8H_{18}	114	63.9	113916
35	4.93	91	Toluene	C_7H_8	92	50.8	291301
36	4.99	55	1,4-Hexadiene, 2,5-dimethyl-	C_8H_{14}	110	7.99	61785
37	5.20	56	1-Heptene, 2-methyl-	C_8H_{16}	112	53.0	113675
38	5.28	55	2-Octene	C_8H_{16}	112	10.1	118191
39	5.36	95	5,5-Dimethyl-1,3-hexadiene	C_8H_{14}	110	14.4	142720
40	5.43	43	Octane	C_8H_{18}	114	28.3	229407

41	5.69	83	Cyclopentane, 1,1,3,4-tetramethyl-, cis-	C_9H_{18}	126	12.2	27589
42	5.79	43	Heptane, 2,4-dimethyl-	C_9H_{20}	128	32.2	155382
43	6.06	69	Cyclohexane, 1,3,5-trimethyl-	C_9H_{18}	126	46.1	114702
44	6.15	70	2,4-Dimethyl-1-heptene	C_9H_{18}	126	49.4	113516
45	6.49	69	Cyclohexane, 1,3,5-trimethyl-, (1α,3α,5β)-	C_9H_{18}	126	36.2	2480
46	6.54	91	Ethylbenzene	C_8H_{10}	106	54.0	158804
47	6.71	91	Cyclohexene, 3,3,5-trimethyl-	C_9H_{16}	124	30.0	114765
48	6.85	109	Cyclohexene, 3,3,5-trimethyl-	C_9H_{16}	124	37.3	114765
49	7.03	43	2-Pentanone, 3-[(acetyloxy)methyl]-3,4-dimethyl-, (.±.)-	$C_{10}H_{18}O_3$	186	7.58	186591
50	7.08	104	Styrene	C_8H_8	104	40.2	291542
51	7.15	43	Hexane, 2,4-dimethyl-	C_8H_{18}	114	9.02	118871
52	7.24	83	Bicyclo[3.1.1]heptan-2-one, 6,6-dimethyl-, (1R)-	$C_9H_{14}O$	138	19.8	108460
53	7.37	55	1,6-Octadiene, 2,5-dimethyl-, (E)-	$C_{10}H_{18}$	138	6.10	62075
54	7.63	105	Benzene, (1-methylethyl)-	C_9H_{12}	120	53.5	228742
55	8.06	57	2-Undecanethiol, 2-methyl-	$C_{12}H_{26}S$	202	3.12	9094
56	8.09	43	cis-3-Decene	$C_{10}H_{20}$	140	16.4	113558
57	8.15	91	Benzene, propyl-	C_9H_{12}	120	47.6	113930

58	8.20	57	Nonane, 4-methyl-	$C_{10}H_{22}$	142	25.8	3834
59	8.27	105	Benzene, 1-ethyl-3-methyl-	C_9H_{12}	120	31.2	228743
60	8.33	105	1-Decen-4-yne, 2-nitro-	$C_{10}H_{15}N_2$	181	9.03	186798
61	8.41	94	Phenol	C_6H_6O	94	27.1	221160
62	8.62	118	α-Methylstyrene	C_9H_{10}	118	34.8	229186
63	8.72	69	3-Undecene, (Z)-	$C_{11}H_{22}$	154	5.05	142598
64	8.76	69	3-Undecene, (Z)-	$C_{11}H_{22}$	154	5.19	142598
65	8.81	69	4-Undecene, (Z)-	$C_{11}H_{22}$	154	4.99	142600
66	8.86	57	Valeric acid, 4-phenyl-	$C_{11}H_{14}O_2$	178	36.0	99257
67	8.92	57	1-Decene, 4-methyl-	$C_{11}H_{22}$	154	8.70	150275
68	8.99	43	Octane, 3,3-dimethyl-	$C_{10}H_{22}$	142	9.88	61706
69	9.06	43	Nonane, 2,6-dimethyl-	$C_{11}H_{24}$	156	10.7	61438
70	9.21	43	4-Decene, 7-methyl-, (E)-	$C_{11}H_{22}$	154	7.95	60846
71	9.40	55	3-Undecene, (E)-	$C_{11}H_{22}$	154	5.14	60565
72	9.52	69	2,3,4-Trimethyl-hex-3-enal	$C_9H_{16}O$	140	6.07	193729
73	9.57	56	4-Undecene, (Z)-	$C_{11}H_{22}$	154	4.74	142600
74	9.78	43	1-Octanol, 2-butyl-	$C_{12}H_{26}O$	186	4.27	114639

75	9.87	43	Undecane, 2-methyl-	$C_{12}H_{26}$	170	5.03	6605
76	10.04	69	4-Chloro-3-n-hexyltetrahydropyran	$C_{11}H_{21}ClO$	204	5.89	216835
77	10.14	69	2-Undecanethiol, 2-methyl-	$C_{12}H_{26}S$	202	4.49	9094
78	10.21	43	1-Octanol, 2,7-dimethyl-	$C_{10}H_{22}O$	158	2.89	5475
79	10.36	55	3-Undecene, (Z)-	$C_{11}H_{22}$	154	4.06	142598
80	10.50	57	Undecane	$C_{11}H_{24}$	156	21.2	114185
81	10.89	43	1-Dodecanol, 3,7,11-trimethyl-	$C_{15}H_{32}O$	228	4.14	114065
82	11.00	43	1-Dodecanol, 3,7,11-trimethyl-	$C_{15}H_{32}O$	228	4.30	114065
83	11.21	91	Benzene, (3-methyl-3-butenyl)-	$C_{11}H_{14}$	146	26.7	27671
84	11.27	69	(2,4,6-Trimethylcyclohexyl) methanol	$C_{10}H_{20}O$	156	15.3	113757
85	11.48	107	5,7-Dodecadiyn-1,12-diol	$C_{12}H_{18}O_2$	194	35.5	136921
86	11.58	69	1-Isopropyl-1,4,5-trimethylcyclohexane	$C_{12}H_{24}$	168	11.4	113584
87	11.92	55	3-Dodecene, (E)-	$C_{12}H_{24}$	168	5.52	113960
88	12.22	69	1-Dodecanol, 3,7,11-trimethyl-	$C_{15}H_{32}O$	228	9.68	114065
89	12.41	121	Phenol, 4-(1-methylethyl)-	$C_9H_{12}O$	136	34.9	229733
90	12.47	43	7-Hexadecenal, (Z)-	$C_{16}H_{30}O$	238	12.0	293051
91	12.53	57	Decane, 2,3,5,8-tetramethyl-	$C_{14}H_{30}$	198	8.79	149589

92	12.65	57	Dodecane, 4,6-dimethyl-	$C_{14}H_{30}$	198	11.0	45335
93	12.76	57	Decane, 2,3,5,8-tetramethyl-	$C_{14}H_{30}$	198	9.12	149589
94	13.15	57	Dodecane, 2,6,10-trimethyl-	$C_{15}H_{32}$	212	6.66	114045
95	13.29	43	2-Hexyl-1-octanol	$C_{14}H_{30}O$	214	5.46	113807
96	13.39	55	7-Tetradecene	$C_{14}H_{28}$	196	10.8	70643
97	13.54	69	1-Nonene, 4,6,8-trimethyl-	$C_{12}H_{24}$	168	3.90	6413
98	13.78	43	1-Nonene, 4,6,8-trimethyl-	$C_{12}H_{24}$	168	4.45	6413
99	14.10	91	Benzenebutanenitrile	$C_{10}H_{11}N$	145	88.6	236852
100	14.15	43	2-Isopropyl-5-methyl-1-heptanol	$C_{11}H_{24}O$	172	4.15	245029
101	14.51	55	1,19-Eicosadiene	$C_{20}H_{38}$	278	6.45	158339
102	14.87	57	Tetradecane	$C_{14}H_{30}$	198	6.60	113925
103	15.62	57	Decane, 2,3,5,8-tetramethyl-	$C_{14}H_{30}$	198	10.2	149589
104	15.72	57	Decane, 2,3,5,8-tetramethyl-	$C_{14}H_{30}$	198	11.5	149589
105	16.07	55	1-Nonadecene	$C_{19}H_{38}$	266	4.05	113626
106	16.16	57	Nonadecane	$C_{19}H_{40}$	268	11.4	114098
107	16.40	69	Trichloroacetic acid, hexadecyl ester	$C_{18}H_{33}Cl_3O_2$	386	5.00	280518
108	16.52	69	1-Decanol, 2-hexyl-	$C_{16}H_{34}O$	242	5.39	114709

109	17.28	69	Cyclododecanemethanol	$C_{13}H_{26}O$	198	8.87	108275
110	18.26	92	Benzene, 1,1'-(1,3-propanediyl)bis-	$C_{15}H_{16}$	196	95.1	229725
111	18.57	57	Benzeneacetic acid, 4-pentadecyl ester	$C_{23}H_{38}O_2$	346	21.1	282028
112	19.30	57	1-Hexadecanol, 3,7,11,15-tetramethyl-	$C_{20}H_{42}O$	298	4.30	194527
113	21.70	57	Nonadecane	$C_{19}H_{40}$	268	6.42	114098

Waste cover of cylinder lattice to fuel product was analysis by gas chromatography and mass spectrometer (GC/MS) with auto sampler (Perkin Elmer Model Clarus 500). Fuel chromatogram and compounds data table showed figure 2 and table 1. Fuel compounds was detected from NIST library based on compound retention time (M) and trace mass (m/z). For compounds detection standard was follow restek hydrocarbon standard. GC/MS analysis purpose was use CS_2 solution to clean the injection syringe before sample and after sample injected into GC/MS. GC/MS inject port temperature was 300 ºC and program temperature was 250 ºC. GC/MS initial temperature was 40 ºC and carrier gas was Helium. GC/MS column was elite capillary and length was 300 meter.

Product fuel GC/MS chromatogram was analysis including compounds name, compounds formula, compounds molecular weight, compounds probability percentage, compounds retention time, and compounds trace mass.

Liquid fuel analysis main goal was what types of compounds present inside fuel and how long carbon chains are present inside the fuel. Product fuel analysis compounds table showed chain showed C_3 to C_{23}. All compounds are not hydrocarbon compounds, analysis compounds table indicate that inside fuel has hydrocarbon compounds including alkane, alkene and alkyl group compounds.

Aromatic group related compounds, alcoholic compounds, oxygen content compounds, nitro group compounds and also halogen content compounds are present inside the fuel. Compounds are appeared such as Cyclopropane (C_3H_6) (t=1.56, m/z=41), 2-methyl-1-Propene (C_4H_8) (t=1.66, m/z=41), cis-1,2-dimethyl- Cyclopropane (C_5H_{10}) (t=2.08, m/z=55), 2-methyl-Pentane (C_6H_{14}) (t=2.41, m/z=43), 2,3-dimethyl-2-Butene (C_6H_{12}) (t=2.74, m/z=41), 2-methyl-1-Hexene (C_7H_{14}) (t=3.69, m/z=56), 4,4-dimethyl-Cyclopentene (C_7H_{12}) (t=3.93, m/z=81), 1-Ethyl-5-methylcyclopentene (C_8H_{14}) (t=4.32, m/z=81), 4-methyl-Heptane (C_8H_{18}) (t=4.89, m/z=43), 2-methyl-1-Heptene (C_8H_{16}) (t=5.20, m/z=56), cis-1,1,3,4-tetramethyl-Cyclopentane (C_9H_{18}) (t=5.69, m/z=83), (1α,3α,5β)-1,3,5-trimethyl-Cyclohexane (C_9H_{18}) (t=6.49, m/z=69), 3,3,5-trimethyl-Cyclohexene (C_9H_{16}) (t=6.85, m/z=109), 2,4-dimethyl-Hexane (C_8H_{18}) (t=7.15, m/z=43), cis-3-Decene ($C_{10}H_{20}$) (t=8.09, m/z=43), 2-nitro-1-Decen-4-yn ($C_{10}H_{15}N_2$) (t=8.33, m/z=105), (Z)-3-Undecene ($C_{11}H_{22}$) (t=8.72, m/z=69), 4-methyl-1-Decene ($C_{11}H_{22}$) (t=8.92, m/z=57), (E)-7-methyl-4-Decene ($C_{11}H_{22}$) (t=9.21, m/z=43), (Z)-4-Undecene ($C_{11}H_{22}$) (t=9.57, m/z=56), 2-methyl-2-Undecanethiol ($C_{12}H_{26}S$) (t=10.14, m/z=69), 3,7,11-trimethyl-1-Dodecanol ($C_{15}H_{32}O$)

(t=11.00, m/z=43), (Z)-7-Hexadecenal ($C_{16}H_{30}O$) (t=12.47, m/z=43), 4,6-dimethyl-Dodecane ($C_{14}H_{30}$) (t=12.65, m/z=57), 2-Hexyl-1-octanol ($C_{14}H_{30}O$) (t=13.29, m/z=43), 4,6,8-trimethyl-1-Nonene ($C_{12}H_{24}$) (t=13.78, m/z=43), 1,19-Eicosadiene ($C_{20}H_{38}$) (t=14.51, m/z=55), 2,3,5,8-tetramethyl-Decane ($C_{14}H_{30}$) (t=15.72, m/z=57), Nonadecane ($C_{19}H_{40}$) (t=16.16, m/z=57), 4-pentadecyl ester Benzeneacetic acid ($C_{23}H_{38}O_2$) (t=18.57, m/z=57) and so on.

Fuel chromatogram analysis compounds table showed also fuel has aromatic group compounds with different retention time such as Benzene (C_6H_6) (t=3.38, m/z=78), Toluene (C_7H_8) (t=4.93, m/z=91), Ethylbenzene (C_8H_{10}) (t=6.54, m/z=91), Styrene (C_8H_8) (t=7.08, m/z=104), (1-methylethyl)-Benzene (C_9H_{12}) (t=7.63, m/z=105), propyl-Benzene (C_9H_{12}) (t=8.15, m/z=91), 1-ethyl-3-methyl- Benzene (C_9H_{12}) (t=8.27, m/z=105), Phenol (C_6H_6O) (t=8.41, m/z=94), α-Methylstyrene (C_9H_{10}) (t=8.62, m/z=118), (3-methyl-3-butenyl)-Benzene ($C_{11}H_{14}$) (t=11.21, m/z=91), 4-(1-methylethyl)-Phenol ($C_9H_{12}O$) (t=12.42, m/z=121), and etc.

Waste cover of cylinder lattice was non coded waste plastic and after conversion GC/MS analysis result showed plastic to fuel has aromatic group compounds. So far we knew that these types of aromatic group compounds are present into polystyrene plastic.

4. CONCLUSION

Waste cover of cylinder lattice plastic to fuel recovery was successfully at temperature 420 ºC. Muffle furnace through glass reactor was use for this experiment. Two step manual process experiment light gas generation percentage was 13.51 % and liquid fuel production percentage was 71.05 %. Product fuel was analysis by GC/MS and compounds found that hydrocarbon including aromatic, alcoholic, and nitrogen content. None coded waste plastic cylinder lattice to fuel GC/MS analysis result showed that fuel has aromatic group compounds.

Aromatic group compounds indicate that cylinder lattice plastic is look like polystyrene group plastic, because polystyrene plastic has aromatic group. Due to aromatic group present in the product fuel it can increase fuel efficiency. Product fuel has long chain hydrocarbon compounds for that reason it can use as diesel fuel.

By using this process non coded waste plastic can convert into liquid fuel and it can use for internal combustion engines. Waste plastic problem are everywhere and this technology can solve the waste plastic problem from environment.

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