ENCLOSURE (A)

Part II
THE IDENTIFICATION OF HYDROCARBONS BY THE USE OF RAMAN SPECTRA

The study of the Raman spectra of organic compounds, as pointed out by Dadieu & Kohlrausch (Ber., 63 (1930) 251. 1675), enables one to identify the substances in a mixture or in the pure state, by means of particular lines in the spectra of organic compounds with particular atomic groups. Various investigators in Japan have employed the Raman spectra for the identification of various hydrocarbons in gasolines and also to detect isomeric substances which were formed in the course of the chemical reaction of alcohols and hydrocarbons (as in the dehydration of n-butanol by the catalytic action with alumina).

The values of the force constant, f, calculated from the data of the Raman spectra for single, double and triple links are roughly proportional to the heat of the rupture of the links. Thus the Raman spectra have enabled the author to observe the behavior of organic compounds under the influence of heat. n-butanol from the market, B.P. 116-7°C, d_4^{20} 0.8098, n_D^{20} 1,3980 was converted, by the dehydration with alumina at 400°C, into n-butene, (of purity 94.7%) which passed over the phosphoric acid catalyst heated at 150°C, with space velocity 300 kg/l-hr and the product shows the physical constants d_4^{20} 0.7116, n_D^{20} 1.4013, M.W. 115, O.N.90.8 & the Raman spectra. (Table IX(A)).

These Raman spectra of the reaction product were compared with those of 2, 3, 4 trimethyl pentane (T. TORIYAMA, J. Chem. Soc. Japan 64 (1943) 1423), 2, 2, 3 trimethyl pentane and also 2,2,4 trimethyl pentane (S. MIZUSHIMA, S. MORINO and OKAZAKI'S results). And it was assumed to be composed of:

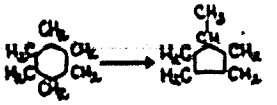
35 - 40% 2,3,4 trimethyl pentane
35 - 40% 2,2,3 trimethyl pentane
and 20 - 25% 2,2,4 trimethyl pentane

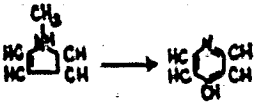
When n-butanol was dehydrated by TAKEDA with alumina at 350°C the product, after water cooling passed the receiver cooled with solid CO_2. The products distilled and their Raman spectra are shown in Table X(A).

These results were compared with those observed by Bourguel and Piaux (Bull. Soc. Chem. 2 (1935) 1958) of butene-1 and also of butene-2 by Gerschinowitz & Wilson (J. Chem. Phy., 6 (1930) 247). This comparison indicates that the product consists mostly of butene-1. (S. MIZUSHIMA, Y. MORINO, R. FUJISHIRO, K. OKAZAKI and Y. KAKIUCHI (1943), unpublished).

The direct-run gasoline from Sanga Sanga oil (O.N. 91.2 with 0.1% Pb.) was fractionated by SONODA, into 23 fractions (Table XI(A).) (Table XI(A).

According to the author's opinion, the occurrence of cyclopentane derivatives, indene, 5-membered carbon ring, pyridine, quinoline, 6 membered carbon and nitrogen ring, in petroleum and coal tars, is due to the isomerization of cyclohexane derivatives and hydronaphthalenes, 6 carbon membered ring, and pyrole derivatives, 5 carbon and nitrogen ring, under the influence of high temperature and high pressure.





Based on this hypothesis, M. HAGIWARA, one of the author's co-workers, studied this problem. He has succeeded in converting cyclohexane and cyclohexene into methyl cyclopentane, and dehydronaphthalene into methyl indene respectively by subjecting them to high temperature and pressure in an autoclave.

He also reported the Reman spectra of these compounds used as an evidence for this chemical change (Tables XII(A), XIII(A).

(Refer also T. HAYASHI: Sci. P. Inst. Phy. Chem. Res. 23 (1934) 274.)

The Raman shifts of indene appears to be smaller than that of 1.2-dihydronaphthalene.

It was noteworthy that a new base has been isolated by T. EGUCHI from Fushun shale tar (Bull. Soc. Chem. Japan 2 (1927) 176; 3 (1928) 227), which, on analysis and examination of its physical (Bp. 199.8° d_4^{25} 1.029, n_D^{25} 1.541, n_α^{25} 1.536; M. R 36.34) and chemical properties was concluded to probably have the structure of a "cyclopentano-pyridine" and was called pyridane. The molecular structure of this base was later confirmed by synthesis by American chemists.

ENCLOSURE (A)

Table IX(A)
RAMAN SPECTRA OF THE ISOMERIZED PRODUCT OF n-BUTENE
(ν, cm^{-1})

220	(o.d)	1075	(3)
300-330	(4)	1100	(0)
347	(1)	1119	(2)
393	(1)	1159	(4b)
418	(0)	1183	(3b)
448	(16)	1205	(1)
470	(5)	1212	(1)
526	(3b)	1245	(3)
570	(4)	1265	(0)
610	(0)	1295	(3)
669	(26)	1319	(4)
688	(1)	1350	(4)
714	(6)	1435	
752	(10b)	1470	(10)
745	(4b)		
810	(4)		
824	(4)		
890	(6)		
700	(2)		
926	(6b)		
965	(6)		
976	(2)		
994	(6)		
1010	(2b)		
1035-1047	(2)		

In table, b = broad line, d = diffused line.

ENCLOSURE (A)

Table X(A)

RAMAN SPECTRA OF THE DEHYDRATED PRODUCT OF n-BUTANOL

(ν cm^{-1})

214	(0)	1293	(6)
387	(1)	1375	(3)
438	(3)	1417	(5)
500	(3)	1456	(4)
585	(0)	1640	(10)
633	(5)	1658	(2)
741	(0b)	1678	(2)
791	(1)	2729	(3)
832	(2)	2854	(4)
850	(4)	2875	(3)
868	(2)	2908	(6b)
910	(3)	2937	(7)
988	(2)	2970	(5)
1017	(3)	3001	(7b)
1065	(3)	3079	(5)
1258	(4)		

ENCLOSURE (A)

Table XI(A)
RAMAN SPECTRA OF EACH FRACTION

	Fraction (°C)	Yield (wt %)		
1.	19~30	3.88	It was confirmed to include 2 methyl butane	2%(wt.)
2.	30~35	2.38	It was confirmed to include 2 methyl butane	2%(wt.)
3.	35~40	0.55	n-pentane	2%(wt.)
4.	40~45	0.16	Cyclopentene	2%(wt.)
5.	45~50	0.21	2.2.-dimethyl butane	1%(wt.)
6.	50~55	0.40	2.3.-dimetnyl butane	1%(wt.)
7.	55~60	0.68	2-.methyl pentane	3%(wt.)
8.	60~65	2.77	3.-methyl pentane	1%(wt.)
9.	65~70	5.30	n-hexane	3%(wt.)
10.	70~75	4.80	methyl cyclopentane	2%(wt.)
11.	75~80	3.69	2.2.-dimethyl pentane	1%(wt.)
12.	80~85	2.22	benzene	7%(wt.)
13.	85~90	1.69	Cyclohexane	6%(wt.)
14.	90~95	5.27	2.4.-dimethyl pentane	2%(wt.)
15.	95~100	8.88	3.3.-dimethyl pentane	1%(wt.)
16.	100~105	8.94	2.-methyl hexane	1%(wt.)
17.	105~110	8.75	trans-1.2.-dimethyl cyclopentane	2%(wt.)
18.	110~115	5.15	n-heptane	2%(wt.)
19.	115~120	2.08	methyl cyclohexane	11%(wt.)
20	120~125	3.41	toluene	14%(wt.)
21.	125~130	4.66	1.3.-dimethyl cyclohexane 1.4.-dimethyl cyclohexane	4%(wt.) 2%(wt.)
22.	130~135	3.97	n-octane	3%(wt.)
23.	135~140	5.38	ethyl benzene 2%(wt.) p-xylene 2%(wt.) m-xylene 6%(wt.) o-xylene 1%(wt.)	

ENCLOSURE (A)

Table XII(A)
RAMAN SPECTRA OF CYCLOHEXANE, CYCLOHEXENE AND METHYLCYCLOPENTANE

Cyclohexane	Cyclohexene	Methylcyclopentane
	178 (1)	
	273 (3b)	281 (1)
375 (1)	395 (5)	292 (5)
425 (2)	451 (2)	428 (2)
	494 (2)	530 (4)
	641 (1)	
	703 (2b)	
800 (8)	825 (8)	780 (3b)
	873 (2)	842 (5)
	905 (3)	886 (8)
	968 (3)	978 (4)
	1038 (2)	1017 (4)
1026 (5)	1066 (6)	1079 (4)
1155 (1)	1159 (10)	
1264 (6)	1220 (5)	1204 (2b)
	1247 (½)	1274 (2)
	1269 (3)	1310 (2b)
1344 (1)	1342 (2b)	1348 (1)
1437 (5)	1433 (8b)	
	1664 (6)	1452 (6b)
2859 (8)	2836 (6b)	2722 (4)
2891 (1)	2869 (3)	2865(12b)
2905 (8)	2912 (6)	2921(10b)
2938 (10)	2957 (6)	2956(15b)

ENCLOSURE (A)

Table XIII(A)
RAMAN SPECTRA OF DIHYDRONAPHTHALENE AND INDENE

1.2.-dihydronaphthalene 	indene 
(ν cm^{-1})	
3026	3038
2760	2765
1618	1589
1554	1534
1472	1445
1375	1379
1332	1343
1280	1276
1202	1190
1145	1140
1091	1099
1020	1049
933	1003
865	924
726	821
	710

ENCLOSURE (A)

Table XIV(A)

RAMAN SPECTRA OF EACH FRACTION OF SANGA SANGA GASOLINE (NO. 1)

30°C~35°C	35°C~40°C	45°C~50°C	50°C~55°C	55°C~60°C	60°C~65°C
	219 (00)		216 (00)	228 (0)	225 (00) 260 (1)
275 (00)	275 (06)	271 (1)	275 (006)	275 (006)	
336 (1) 369 (0) 401 (5)	336 (2) 365 (1) 401 (7)	337 (0) 402 (5)	332 (16) 363 (0) 401 (3) 445 (2)	326 (26) 401 (1) 445 (4)	324 (26) 366 ⎤ (1) 404 ⎦ 445 (4)
463 (36)	464 (36)	464 (16)	467 (00) 478 (00) 505 (00) 530 (00) 548 (00)	478 (0) 504 (0)	478 (0) 506 (00) 528 (00)
	662 (00)			548 (00) 607 (0)	607 (2)
	709 (2)	692 (00)			674 (00)
	732 (00)	712 (4) 732 (1)	712 (4) 730 (2)	711 (3) 730 (3) 749 (1)	712 (1) 728 (2) 749 (1)
761 (2) 766 (8)	762 (2) 760 (7)	766 (4) 779 (00) 794 (1)	766 (2)	767 (1)	
796 (6)	795 (4)		797 (1)	799 (00)	
843 (6)	841 (6)	817 (1) 843 (4)	814 (3) 842 (3)	815 (5) 840 (1)	801 (0) 815 (5)
868 (5)	866 (5)	849 (2)	871 (2)		847 (1)
	888 (6)	869 (7)		871 (0)	871 (1)
910 (3)	909 (34) 924 (00)	908 (1)	890 (76)	891 (6)	891 (46)
			928 (00)	928 (0) 940 (0) 957 (3)	
954 (4) 957 (1)	954 (3) 989 (2)	954 (1)	957 (8)		941 (1) 957 (3)
		993 (1)	994 (1)	993 (5) 1018 (00)	991 (10) 1017 (1)
1033 (1) 1039 (4) 1072 (34) 1146 (8)	1028 (5) 1039 (5) 1073 (8) 1145 (3) 1156 (2) 1179 (2)	1029 (3) 1037 (3) 1073 (2) 1146 (2)	1013 ⎤ 1041 ⎦ (3) 1073 (34) 1147 (3)	1038 (4) 1094 (34) 1148 (4)	1036 (5) 1076 (34) 1147 (4)
1178 (16)		1220 (1) 1254 (1) 1280 (1) 1294 (1)		1178 (3)	1180 (46)
	1222 (16)		1221 (06) 1259 (06)	1221 (006) 1253 (006)	
1267 (16) 1304 (34) 1334 (1)	1248 (1) 1303 (34) 1336 (1)	1302 (4) 1334 (1)	1302 (36) 1339 (16)	1302 (46) 1339 (36)	1270 (0) 1301 (3) 1338 (2) 1364 (0)
1429 ⎤ 1460 ⎦ (7)	1436 ⎤ 1470 ⎦ (6)	1436 ⎤ 1460 ⎦ (6)	1438 (66) 1461 (66)	1442 (46) 1466 (66)	1431 ⎤ 1460 ⎦ (5) 1597 (1) 1607 (1)
2643 (06)	2653 (00) 2669 (24) 2690 (1) 2720 (3)		2629 (00) 2671 (00)	2629 (0)	
2720 (2)			2719 (2)	2717 (3)	
2737 (2)	2737 (3)	2720 (36)	2738 (2)	2737 (2)	2718 ⎤ 2740 ⎦ (3)
[illegible] (8) 2875 (106) 2906	2840 (9) 2874 (16) 2907 (6)	2843 (3) 2872 (106) 2904 (7)	2842 (6) 2871 (16) [illegible] (7) [illegible] (7)	[illegible]	2734 (10) 2867 (8) 2869 (106) (7)
[illegible] (7) [illegible] (36)	[illegible] (3) 2871 (3)	2867 (7) 2964 (36)	2968 (76) 2964 (2)	[illegible]	[illegible]

ENCLOSURE (A)

Table XV (A)

RAMAN SPECTRA OF EACH FRACTION OF SANGA SANGA GASOLINE (NO. 2)

65°C~70°C	70°C~75°C	75°C~80°C	80°C~85°C	85°C~90°C	90°C~95°C
	215 (006)	210 (00)	215 (1)	215 (1)	
225 (00) 250 (00)	255 (0)	261 (0) 306 (0)	261 (0) 307 (0)	263 (0) 305 (1)	217 (1) 261 (0) 305 (1)
304 ⎤ (0) 334 ⎦	316 (06)				
		350 (00)	347 (00)	353 (00)	347 (00)
370 (1) 385 (00)	366 (0)	381 (06)		383 (0)	386 (00) 403 (1)
	404 (00)		399 (10)		
405 (0) 427 (00)	422 (0)	427 (1)	426 (1)		427 (00)
444 (2)	445 (0)			432 (1) 443 (00)	445 (1) 462 (00)
				495 (00) 521 (0)	496 (0) 516 (1)
530 (0)	587 (0)	531 (0)			
			542 (00)	543 (0)	545 (1) 556 (00)
607 (3)	606 (5)	607 (3)	606 (2)	607 (1)	607 (1) 623 (0)
	621 (00)	693 (0)	659 (0)	693 (0)	
726 (00) 747 (00)	742 (0)				697 (00) 729 (00)
779 (00)		771 (00)	771 (0)	769 (2)	769 (4) 784 (3)
800 (2) 815 (26)	800 (4) 814 (06)	807 (7)	786 (00) 802 (7)	786 (2) 802 (6)	801 (6)
840 (1) 870 (0)	846 (1)	825 (00) 848 (2)	822 (00) 845 (0)	823 (0) 844 (0) 840 (00)	826 (00) 844 (0)
					880 (00)
891 (36)	890 (26)	899 (2)			
			896 (0)	896 (1)	906 (1) 919 (00)
957 (1)	957 (0)	959 (00)	958 (0)	956 (0)	962 (1) 972 (0)
954 (1) 991 (12)	954 (3) 991 (12)	955 (3) 991 (12)	994 (1) 992 (10) 1004 (0)	992 (0) 1004 (2)	992 1005 (8)
1030 (06) 1037 (3) 1064 (0) 1077 (2)	1033 (36) 1060 (00) 1081 (36)	1030 (36) 1079 (16) 1113 (00) 1142 (0)	1033 (36) 1080 (1)	1027 (36) 1080 (16)	1031 (6) 1042 (00) 1063 (0) 1079 (16)
1141 (36)	1138 (1)		1148 (11)	1141 (1) 1160 (2)	1144 (16) 1161 (8)
1168 (3)	1150 (1) 1166 (4)	1160 (2) 1163 (06)	1150 (3) 1166 (2)	1168 (2)	1168 (0) 1191 (0) 1210 (8)
	1261 (006)			1212 (1)	
1307 (1) [illegible] (2)	1306 (3) [illegible] (3)	1306 (3) 1308 (16)	1306 (4) 1306 (16)	1300 (0) 1306 (4) 1308 (1)	1309 (1) 1306 (8) 1308 (26)
[illegible] ⎤ (1) [illegible] ⎦	1340 (8)	1347 (10)	1343 (8)	1346 (8)	1341 (26)
			1379 (0)	1379 (0)	1380 (1)
[illegible] ⎤ (26) [illegible] ⎦ [illegible]	[illegible] ⎤ (4) [illegible] ⎦ [illegible]	1443 (18) [illegible]	1443 (8) [illegible]	1443 (26) [illegible] 1467 (1)	1445 (26) [illegible] 1467 (1)
[illegible] (1)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] (26)	[illegible]	[illegible]	[illegible]	[illegible] 2844 (126)	[illegible] (2)
[illegible] (7) [illegible]	[illegible] (6) (8)	[illegible] 2927 (6)	[illegible] (6)	2870 (7)	[illegible] (7)
			[illegible] (06)	[illegible] (06) [illegible] (06)	[illegible] (7) [illegible] (8)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ENCLOSURE (A)

Table XVI(A)
RAMAN SPECTRA OF EACH FRACTION OF SANGA SANGA GASOLINE (NO. 3)

95～100°C	100～105°C	105～110°C	110～115°C	115～120°C	120～125°C
216 (3)	215 (3)	214 (36)	218 (36)	217 (26)	154 (0) 214 (06) 234 (1)
261 (1) 281 (00) 306 (2) 348 (0)	260 (0) 311 (0) 346 (0)	216 (0) 309 (0) 345 (1)	258 (00) 278 (00) 309 (00) 345 (0) 371 (00)	257 (00) 278 (00) 312 (00) 340 (00) 373 (00)	257 (00) 279 (1) 310 (00) 374 (00)
385 (00) 405 (3)	405 (1)	403 (1)	407 (00) 418 (00)	409 (0) 420 (1)	410 (06) 418 (4)
445 (2)	445 (1)	446 (1)		457 (06)	453 (16)
464 (0)		468 (1)			
496 (0) 520 (3)	494 (00) 520 (2)	495 (00) 530 (4)	495 (00) 521 (4)	495 (0) 520 (2)	474 (00) 496 (3) 518 (1) 535 (2) 543 (4)
544 (2) 622 (1)	544 (1) 624 (1)	545 (1) 622 (26)	545 (0) 623 (3) 701 (00) 728 (1)	544 (1) 621 (16) 702 (1) 725 (1) 748 (1)	703 (1) 725 (4) 748 (3)
728 (0) 752 (0)	731 (0)	728 (1)			
768 (6) 784 (5) 800 (1)	767 (4) 785 (5)	767 (2) 785 (8)	762 (1) 768 (1) 785 (8)	760 (2) 769 (2) 784 (5)	759 (3) 769 (4) 784 (3)
	809 (00)	809 (1)	811 (1)	808 (00)	
844 (3)	842 (2)	843 (2)	843 (1)	846 (00)	838 (0) 849 (00) 867 (00) 876 (00) 894 (0)
896 (16)	896 (00)	896 (1)	895 (1)	875 (00) 895 (00) 934 (00) 951 (00) 975 (0)	
957 (1) 974 (2) 991 (1) 1003 (8) 1030 (6) 1068 (1)	956 (00) 975 (1) 992 (00) 1003 (10) 1031 (5) 1056 (0)	958 (00) 974 (2) 991 (00) 1002 (10) 1029 (4) 1056 (0)	975 (2) 992 (00) 1003 (10) 1029 (7) 1056 (2)	1002 (10) 1029 (4) 1059 (2) 1075 (06)	964 (06) 980 (00) 1002 (7) 1038 (3) 1057 (5) 1074 (16)
1081 (26) 1136 1157 (16)	1082 (06)	1086 (06)	1083 (06)	1136 (06) 1154 (1)	1136 (16)
1160 (2) 1179 (0) 1192 (2) 1211 (3)	1164 (16) 1179 (0) 1203 (3)	1154 (2) 1180 (1) 1208 (5)	1154 (3) 1176 (2) 1208 (6)	1176 (1) 1208 (3) 1219 (1) 1248 (2)	1167 (2) 1207 (1) 1215 (1)
1246 (2) 1265 (2) 1303 (2) 1344 (2) 1363 (1) 1378 (2) 1403 (0)	1245 (1) 1265 (1) 1303 (16) 1344 (1) 1378 (1)	1246 (2) 1264 (1) 1304 (16) 1347 (16) 1378 (2) 1408 (1)	1265 (00) 1305 (16) 1342 (06) 1378 (4) 1399 (1)	1264 (1) 1302 (26) 1343 (36) 1378 (2)	1246 (2) 1264 (2) 1302 (26) 1344 (36) 1378 (3)
1438–1467 (5)	1441 (36) 1460 (36)	1440 (36) 1460 (36)	1440 (36) 1459 (36)	1450 (46) 1459 (36)	1436–1455 (6) 1461 (7)
1586 (1) 1607 (2) 2629 (0) 2662 (1) 2726 (16)	1586 (1) 1607 (3) 2662 (0) 2726 (06)	1587 (2) 1606 (3) 2641 (0) 2728 (0) 2740 (0)	1585 (2) 1605 (3) 2661 (1) 2728 (1) 2746 (1)	1587 (1) 1604 (2) 2667 (0) 2727 (06)	1606 (1) 2667 (1) 2727 (16)
2846 (10s) 2871 (10s) (6) 2901 (10s) 2941 (36) 2946 (36) 2961 (36)	[illegible] (8) 2874 (6) 2911 (8) [illegible] (36) [illegible] (4) [illegible] (36) [illegible] (36)	2840 (4) 2874 (6) 2909 (4) 2940 (3) 2961 [illegible] [illegible] (36) [illegible] (46)	2860 (4) 2872 (6) 2881 (6) [illegible] (4) [illegible] (42) [illegible] (46)	2860 (6) 2876 (6) 2898 (7) [illegible] (7) [illegible] (36) [illegible] (4)	2840 (10) 2876 (4) 2880 (3) (3) 2901 (3) 2966 (36)

ENCLOSURE (A)

Table XVII(A)

RAMAN SPECTRA OF EACH FRACTION OF SANGA SANGA GASOLINE (NO. 4)

125°C~130°C		130°C~135°C		135°C~140°C	
151	(06)	152	(2)	151	(00)
200	(0)	201	(2)	199	(2)
225	(2)	226	(4)	228	(36)
256	(00)	256	(00)	278	(36)
279	(2)	276	(3)	309	(2)
310	(0)	309	(3)	358	(00)
375	(0)	362	(0)	398	(00)
407	(00)	402	(00)	455	(3)
418	(2)	421	(00)	491	(00)
454	(1)	443	(00)	515	(3)
496	(1)	455	(4)	535	(5)
512	(1)	482	(00)	557	(0)
534	(0)	497	(1)	580	(1)
543	(1)	516	(4)	621	(0)
623	(00)	536	(4)	645	(2)
645	(0)	543	(1)	704	(0)
706	(0)	556	(0)	724	(10)
723	(6)	581	(0)	735	(2)
745	(3)	622	(1)	770	(3)
761	(2)	646	(2)	812	(2)
770	(4)	706	(1)	828	(4)
826	(4)	725	(8)	840	(00)
844	(00)	735	(1)	877	(00)
857	(0)	748	(28)	894	(00)
878	(00)	769	(3)	940	(00)
896	(0)	795	(0)	1000	(10)
954	(006)	809	(1)	1021	(3)
983	(00)	828	(5)	1031	(2)
1001	(8)	842	(1)	1062	(00)
1031	(3)	856	(00)	1083	(00)
1059	(6)	878	(00)	1098	(2)
1076	(1)	895	(00)	1157	(00)
1094	(06)	939	(00)	1204	(8)
1128	(06)	954	(00)	1219	(0)
1168	(2)	1000	(10)	1247	(4)
1205	(3)	1030	(20)	1266	(2)
1219	(1)	1068	(16)	1310	(1)
1247	(4)	1081	(0)	1378	(4)
1294	(26)	1096	(1)	1432	(3)
1305	(36)	1140	(006)	1445	
1344	(26)	1164	(16)	1507	(1)
1378	(6)	1204	(8)	1561	(2)
1448	(78)	1220	(06)	1608	(2)
1461	(8)	1248	(5)	1619	(3)
1584	(0)	1306	(8)	[illegible]	(0)
1613	(20)	1300	(0)	[illegible]	(1)
[illegible]	(00)	1347	(16)	[illegible]	(2)
[illegible]	(0)	1377	(6)	[illegible]	(6)
[illegible]	(1)	1441	(24)	[illegible]	(46)
[illegible]	(6)	1462	(26)	[illegible]	(36)
[illegible]	(10)	1496	(3)	[illegible]	(0)
[illegible]	(7)	1608	(3)	[illegible]	(1)
[illegible]	[illegible]	1620	(4)	[illegible]	(2)
[illegible]	(5)	[illegible]	(2)		
[illegible]	(1)	[illegible]	(2)		
[illegible]	(5)	[illegible]	[illegible]		
		[illegible]	(7)		
			(8)		
		[illegible]	[illegible]		
		[illegible]	(46)		
		[illegible]	(1)		
		[illegible]	(2)		
		[illegible]	(36)		

ENCLOSURE (A)