Examination questions KEB-64256 "IR-spectroscopy"

Examination date	15.12.2016
Auditorium K1705	0900-1200
Examiner	Alexander Efimov, University lecturer, FC218 TUT/KEB
Total pages:	4

Students are allowed to use the attached reference table (6 pages)

Question 1 (5 points max)

Draw schematically and briefly explain the operational principles of ATR (Attenuated Total Reflectance) method of IR measurements.

Question 2 (5 points max)

Describe the methods of measurements of liquid samples in IR and how the samples are prepared in each case.

Question 3 (12 points max)

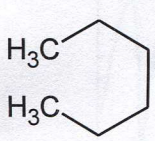
Deduce the structures of the compounds from the **Spectra 3a** and **3b** and brutto-formula. Mark the fragments in the molecule and their corresponding peaks in the spectra.

Question 4 (5 points max)

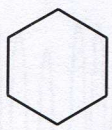
Select, which compound (**4A**, **4B**, **4C**, **4D**) is best corresponding to the **Spectrum 4**. Mark the fragments in the molecule and their corresponding peaks in the spectrum.

Question 5 (16 points max)

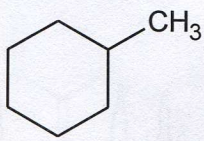
Select which of the compounds **5A-5F** corresponds to **Spectra 5-1**, **5-2**, **5-3**, **5-4**. Mark the fragments in the molecule and their corresponding peaks in the spectrum.



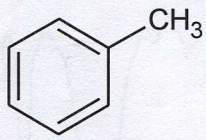
5A



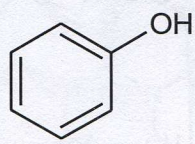
5B



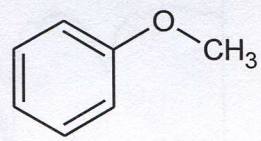
5C



5D



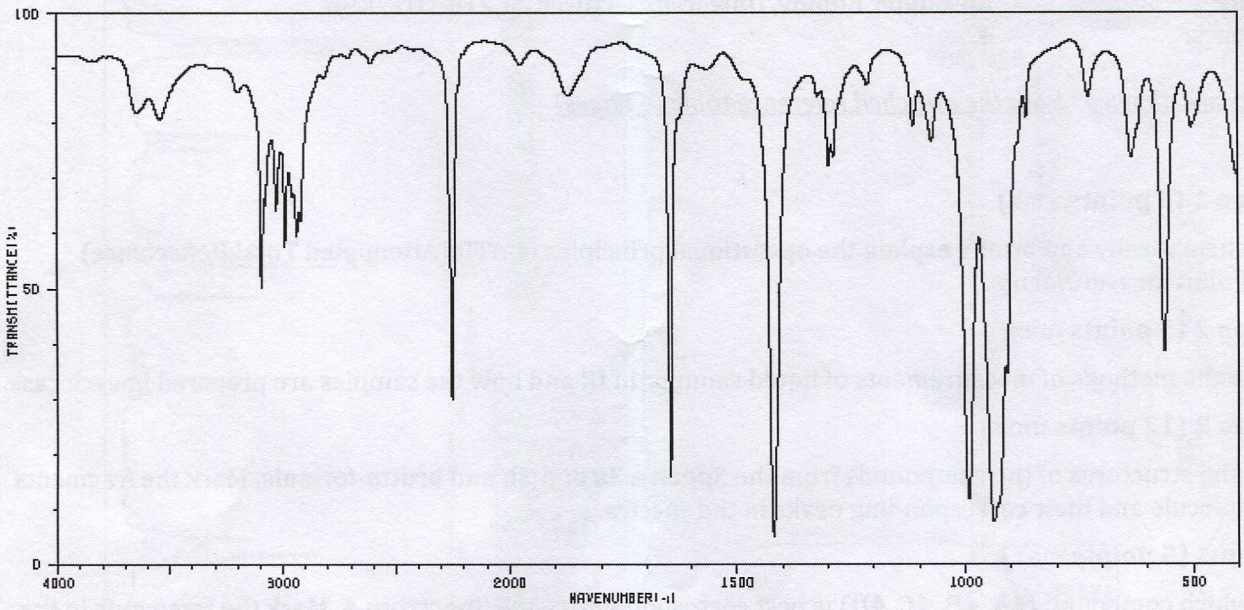
5E



5F

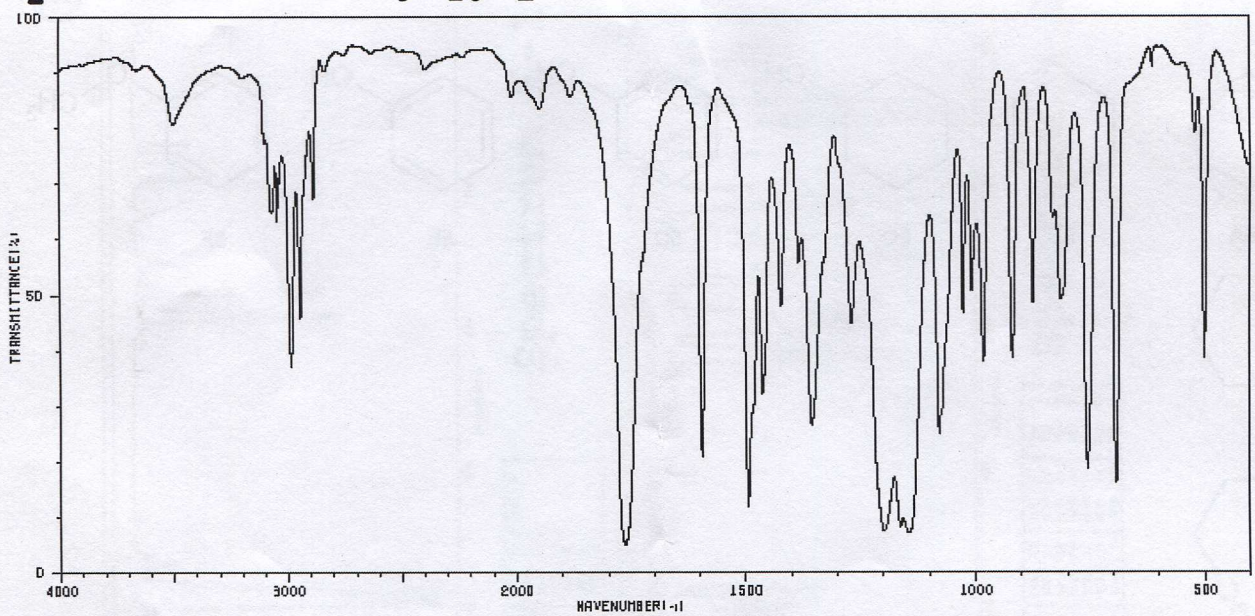
Question 3

Spectrum 3a C_4H_5N



3645	79	2969	64	1299	70	908	39
3545	77	2939	57	1289	70	867	79
3199	81	2922	60	1214	84	730	61
3094	47	2262	28	1114	77	636	70
3077	62	1870	81	1073	74	563	37
3030	62	1645	15	991	11	505	77
2991	66	1419	4	937	7	600	77

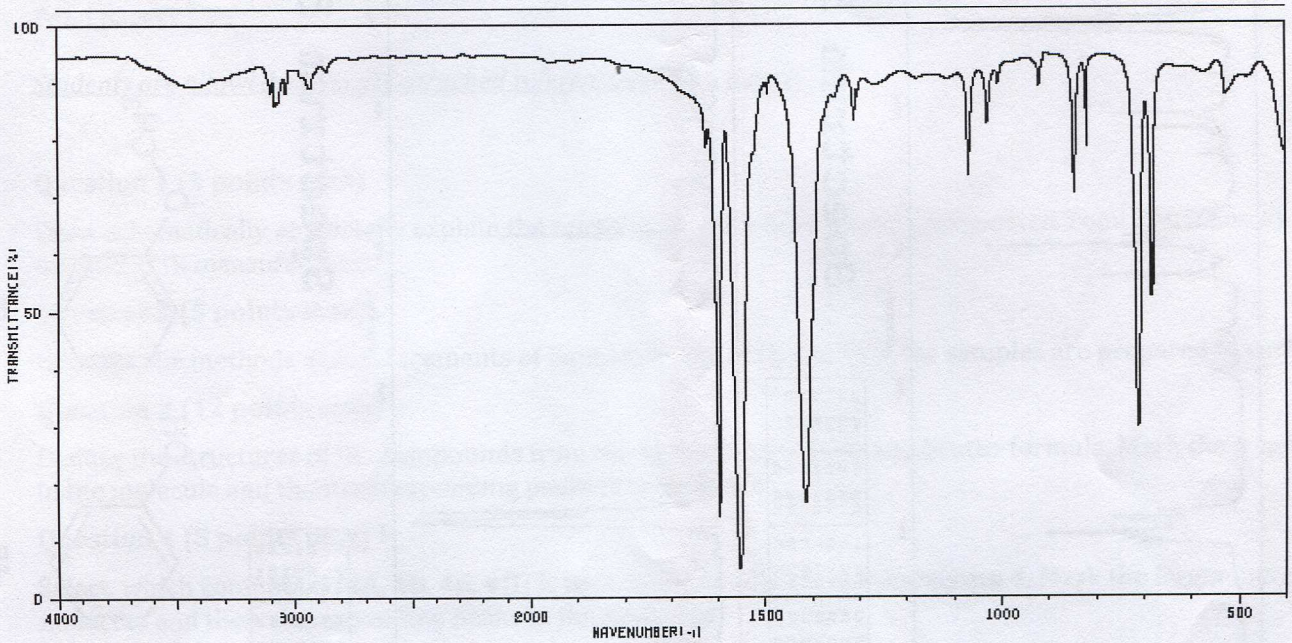
Spectrum 3b $C_9H_{10}O_2$



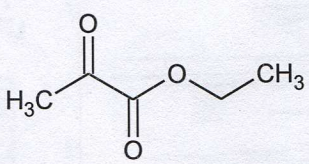
3499	77	2015	81	1422	46	1077	29	830	60
3069	62	1946	81	1384	53	1072	27	813	47
3044	60	1879	81	1355	25	1025	44	754	16
3033	68	1763	4	1269	43	1006	49	692	15
2985	35	1594	20	1199	7	981	36	522	77
2944	43	1494	11	1164	7	918	37	499	37
2885	64	1463	31	1145	6	874	46		

Question 4

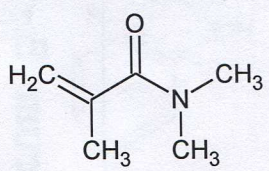
Spectrum 4



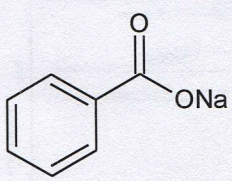
3090	84	1563	4	1007	86	620	84
3072	84	1492	84	919	86		
3058	84	1413	15	846	66		
3028	84	1308	78	820	74		
2925	86	1301	84	711	28		
1622	74	1069	70	680	50		
1596	13	1030	78	627	84		



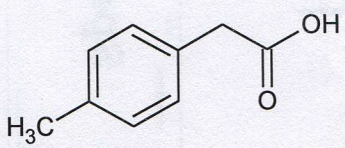
4A



4B

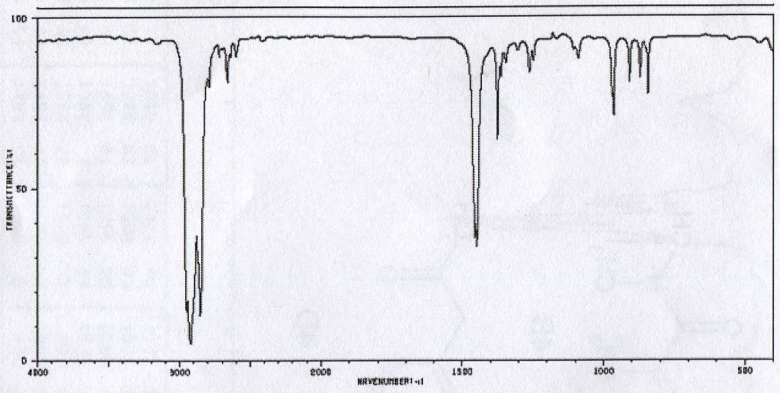


4C



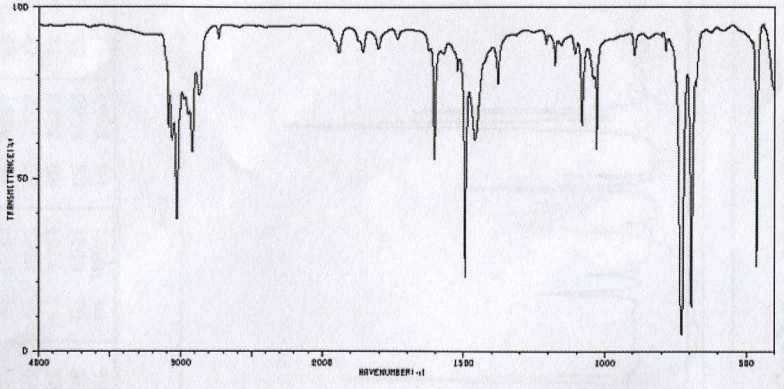
4D

Question 5



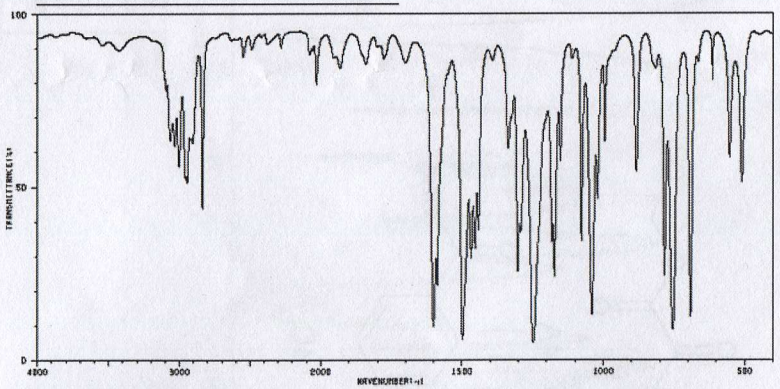
2949	13	2800	84	1263	79	843	74
2923	4	1458	34	1249	84		
2854	12	1449	32	1091	84		
2792	77	1376	62	870	72		
2720	84	1363	79	964	68		
2662	77	1348	64	909	77		
2641	84	1306	86	872	79		

Spectrum 5-1



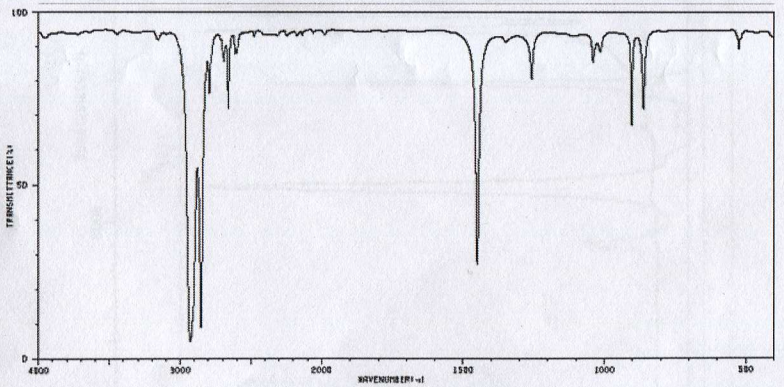
3087	62	1658	84	1210	86	895	81
3062	58	1603	84	1179	79	786	84
3026	37	1605	55	1156	86	729	4
2948	66	1524	79	1107	84	696	12
2920	55	1498	20	1082	62	678	74
2873	70	1451	58	1042	77	465	25
1942	84	1379	74	1030	67		

Spectrum 5-2



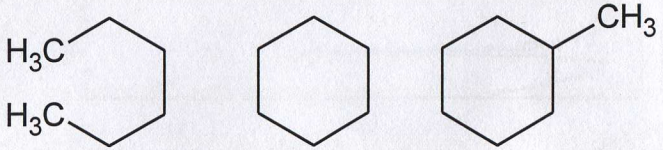
3094	74	2906	60	1468	27	1182	32	884	62
3063	60	2836	42	1454	31	1173	29	784	23
3035	58	2031	77	1442	36	1153	55	755	6
3009	63	1702	61	1337	58	1076	39	692	12
2957	50	1601	9	1303	24	1041	12	614	77
2945	49	1588	20	1293	35	1021	44	553	57
2926	60	1498	5	1248	4	996	60	511	49

Spectrum 5-3



2928	4	1460	28
2853	8	1257	77
2794	72	1039	81
2690	81	1015	84
2661	70	904	64
2615	84	852	88
2599	84	624	86

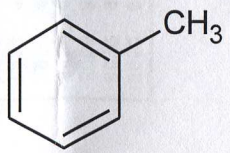
Spectrum 5-4



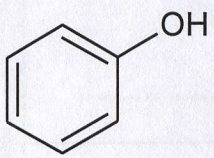
5A

5B

5C



5D



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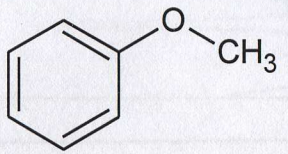

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