

27. LIGHT HYDROCARBONS AT SITES 367-370, LEG 41

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Our analytical procedure has been modified to enable the entire C₁-C₇ range to be run in detail from the same gas sample. The method is the same as reported in the Leg 22 volume of Initial Reports of DSDP except the gas space sample is analyzed on both a packed and capillary column. One aliquot is injected in the HHK capillary column as previously discussed for Leg 22. The other aliquot is injected in matched dual packed columns containing 4 ft × 1/8 in. Spherosil (Supelco, Inc.) attached to 12 ft × 1/8 in. of 20% OVIOI on Anakrom 100/110 AS (Analabs). Carrier gas is helium. The C₁-C₇ data for samples from Sites 367, 368, 369, and 370 are shown in Table 1.

The yield of C₄-C₇ hydrocarbons from Sites 367 and 368 were in the intermediate range of most DSDP samples comparable to Site 364, Leg 40. The yields from Sites 369 and 370 were low, comparable to Sites 388 and 391, Leg 44. Site 370 shows a marked decrease in yields with depth going from the Cenomanian to Neocomian. The lithology change is from limestone to

sandy silts and cemented sands. The black shales typical of other areas are absent in this hole. It appears that the organic matter is too oxidized, or coaly, to yield petroleum hydrocarbons other than methane. The methane may be largely biogenic in origin or from the thermal decomposition of coaly organic matter.

The gassy or oily nature of the organic matter can be compared from the ratio of yield of methane to higher hydrocarbons. This ranges from 0.7 for Section 368-63-3 (oily) to 15 for Section 370-45-2 (gassy).

Section 368-63-3 is particularly unusual in containing a high percentage of gem-dimethyl hydrocarbons. These are branched chain hydrocarbons with two methyl groups on the second carbon of the chain. Note the relatively high yields for 2,2-dimethylpropane (neopentane), 2,2-dimethyl-butane, and -pentane. These may originate from terpenes (land derived).

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TABLE 1
C₁-C₇ Hydrocarbons, Leg 41

	367-19-4	368-63-3	369A-43-2	370-22-2	370-34-4	370-45-2
Depth (m)	649	979	444	694	878	1065
Hydrocarbons	Concentrations (ng/g)					
Methane	7257	169.1	556	54.1	89.5	4.43
Ethane	195.9	32.9	87.8	1.16	3.51	0.17
Propane	92.9	4.79	120.6	2.02	2.36	0.048
i-Butane	50.5	0.71	23.7	0.66	0.45	0.021
n-Butane	3.22	1.46	26.8	3.01	1.71	0.050
neoPentane	0.78	11.2	Trace	Trace	0.63	0
i-Pentane	43.1	2.90	21.4	2.81	1.88	0
n-Pentane	22.2	4.31	8.97	6.28	2.81	0
Cyclopentane	2.05	0.94	1.82	0.24	0.11	0
2,2-Dimethylbutane	0.042	4.91	0.021	0.018	Trace	0
1,3-Dimethylbutane	2.74	18.4	0.20	0.091	0.056	0
2-Methylpentane	23.6	3.86	1.54	1.37	1.02	0
3-Methylpentane	3.12	2.28	0.16	0.15	0.088	0
n-Hexane	25.3	3.91	0.42	2.00	0.46	0
Methylcyclopentane	4.51	3.91	0.68	0.44	0.19	0
2,2-Dimethylpentane	0.033	1.06	0	0	0	0
2,4-Dimethylpentane	0.61	1.59	0.061	0.33	0.037	0
2,2,3-Trimethylbutane	0	0	0	0	0	0
Cyclohexane	5.34	10.8	0.11	0.082	0.041	0
3,3-Dimethylpentane	0	2.49	0	0	0	0
1,1-Dimethylcyclopentane	0	29.2	0	0	0	0
2-Methylhexane	0.065	4.98	0.082	0.28	0.12	0
2,3-Dimethylpentane	4.04	10.0	0.16	0.57	0.24	0
3-Methylhexane	3.18	20.0	0.23	0.73	0.22	0
1-t-3-Dimethylcyclopentane	1.60	7.04	0.12	0.48	0.18	0
1-t-2-Dimethylcyclopentane	128.9	18.6	0.064	0.52	0.44	0
3-Ethylpentane	0	n.d.	0	0.012	0	0
n-Heptane	52.2	6.4	0.23	2.45	0.25	0
1-C-2-Dimethylcyclopentane	3.40	3.52	Trace	0.11	0	0
Methylcyclohexane	2.44	29.1	0.11	0.27	0.14	0
Benzene	1.34	1.27	0.098	0.029	0.019	0
Toluene	0.64	5.30	0	0.16	0	0
Total C ₁ -C ₃ ng/g	7503	206.8	764.4	57.3	95.4	4.65
Total C ₄ -C ₇ ng/g	385.9	212.9	85.2	23.1	11.1	0.07
Wt % organic carbon	6.5	1.4	n.d.	1.3	1.4	n.d.