Origin of sediment gases in Gulf of Kutch using molecular and isotopic studies

D.J. PATIL AND A.M. DAYAL

(duttapats@rediffmail.com, dayalisotope@yahoo.com)

Mesozoic sediments world over are known to have copious amount of oil and gas reserves. Gulf of Kutch on the northern part of west coast of India is a unique basin where the basaltic flows (erupted during Cretaceous) separate the Tertiary from the Mesozoic sediments. This volcanic activity may have acted as a catalyst in hydrocarbon generation. Gravity coring of sediments for surface geochemical prospecting studies applying gas chromatography and carbon isotopic studies have been used to assess the type of hydrocarbon gases present in the sediments. Gas chromatographic measurements indicate the generation of light gaseous hydrocarbons, C1 and $\sum C2+$ in the range of 36 to 475 ppb and 1 to 1449 ppb, respectively. The carbon isotopic signatures ($\delta C13$ CH_4 in the range of – 37.7 to – 44.0‰ PDB) and elevated wet gas components suggest thermogenic origin for the gases resident in Gulf of Kutch sediments.

Autoliths as samples of kimberlite magma

M. PATTERSON[1]*, D. FRANCIS[1] AND T. MCCANDLESS[2]

[1]Earth & Planetary Science, McGill University, 3450 University Street, Montreal, Quebec, H3A 2A7 (*correspondence: bodhi123@eps.mcgill.ca)

[2]Stornoway Diamond Corporation, Suite #800 - 625 Howe St.Vancouver, B.C, Canada, V6C 2T6

The nature of kimberlite magma is obscured by the hybrid, contaminated, and altered nature of most kimberlite occurrences. Many kimberlites, however, contain fine-grain autoliths that may represent samples of cognate magma. To test this possibility, we analyzed autoliths from the Buffalo Head Hills (BHH) kimberlite cluster in Northern Alberta, Canada using a defocused electron microprobe beam. These autoliths occur as ovoid lapilli (1-15mm) consisting primarily of fine-grained serpentine (<200 μm) and carbonate (<10 μm), with rare olivine, chlorite, perovskite, illmenite, magnetite and apatite (<10 μm). Many of these lapilli are cored by fresh olivine macrocrysts, while others are not, but in all cases the spots analyzed by microprobe were free of olivine xenocrysts. The compositions of these fine-grained autoliths are similar to that of the published average whole rock from the K6 pipe in terms of Fe and Si, but are significantly lower in Mg. Furthermore, the autolith and whole rock compositions define two distinct linear tends sharing a common end-member in a plot of Ca versus Mg + Fe. The whole rock is explained by the addition of xenocrystic olivine to the end-member. The autolith trend can be explained by the lack of xenocrystic olivine and varying amounts of carbonate. The common end-member contains ~20 % CO2 and is similar in composition to experimentally-produced kimberlite liquids.