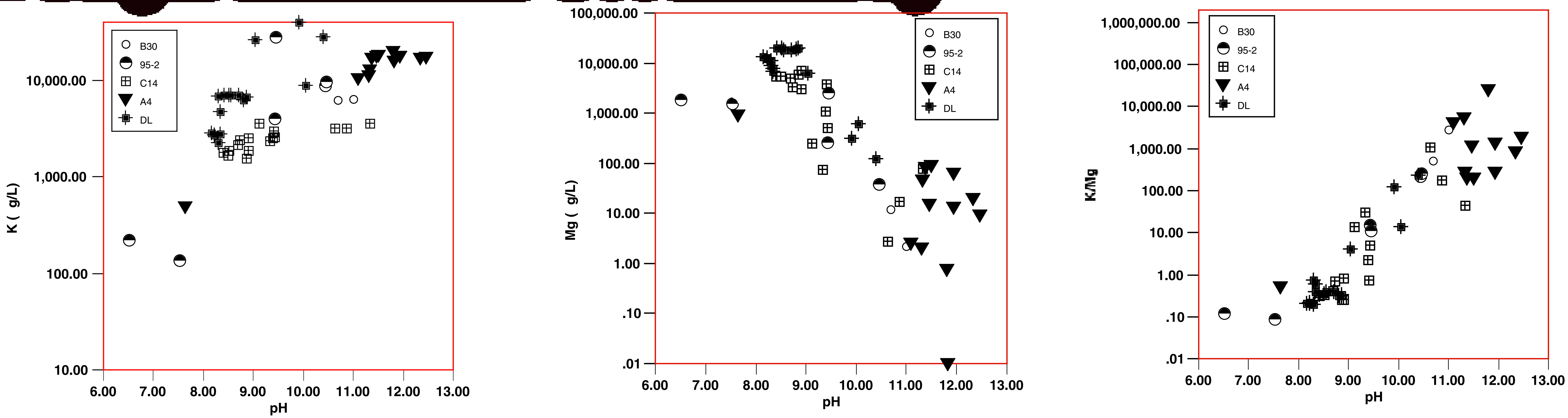
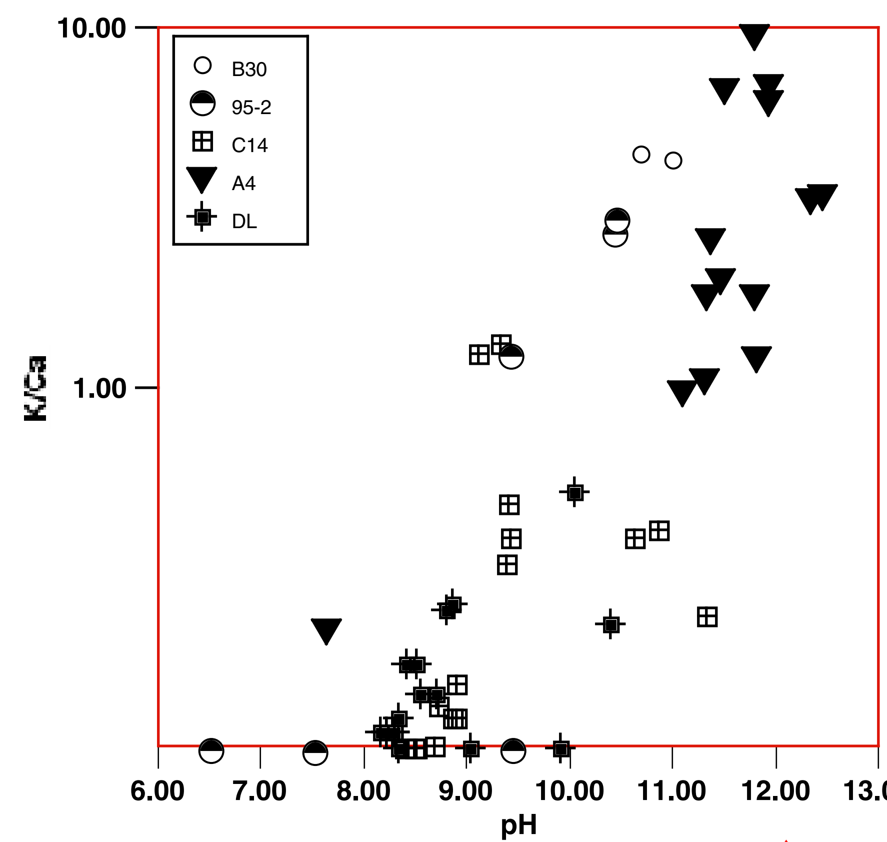
8. Major Elemental Geochemistry



Relationships between K, Mg and pH.

The kimberlitic waters are unusual in that the ratio of K to Mg is large and directly proportional to the pH. This positive correlation suggests that the Mg is being buffered whereas the K is not. In most groundwaters, K is typically controlled by clay formation (e.g. illite). The Mg may be locked in alteration minerals such as brucite [$(Mg(OH)_2)$], serpentine [$Mg_3Si_2O_5(OH)_4$], and diopside [$CaMgSi_2O_6$], which can be supersaturated in waters from ultramafic rocks (Barns and O'Neil 1969, Barns et al., 1972). Barns et al. (1972) also showed that as the pH is high in waters from ultramafic rocks, the amount of potassium is several times higher than the magnesium. The values of K in Barns et al. (1972) also demonstrates elevated levels with a drastic decrease in Mg. The potassium in our waters are at concentrations as high as 39600 mg/L and Mg values as low as the detection limit. Again, kimberlite A4 is the anomaly with respect to the other kimberlites and has the most consistently high K and low Mg contents. A4 has an average potassium amount of 16100 mg/L and an average Mg content of 27.4 mg/L.



Relationship between pH and K/Ca.

The trend for pH vs K/Ca follows the same trend as pH vs K/Mg. This is due to to high pH causing the Ca to precipitate out of solution to the point where all carbonates have been removed.