

Table 2.4: Relative Percent Differences (RPD) of Duplicate Samples

Sample Type	Method	Gas Mix	Conductivity (RPD) umhos/cm	Calcium (RPD) mg/L	SO ₄ (RPD) mg/L	Alkalinity (RPD) mg/L CaCO ₃
Shale (Initial Flush) ¹	Column	Air	5.36	2.96	4.35	0
		Air-CO ₂	6.06	6.83	10.06	4.96
	Cell	Air	1.60	1.94	0	4.44
		Air-CO ₂	0.70	3.39	0	4.08
Shale (15-week pooled) ²	Column	Air	7.77	10.77	17.47	33.25
		Air-CO ₂	13.85	21.73	18.09	41.86
	Cell	Air	12.19	8.52	21.21	36.47
		Air-CO ₂	17.62	17.36	16.45	28.20
Sandstone (Initial Flush) ¹	Column	Air	5.36	2.96	4.35	0
		Air-CO ₂	6.06	6.83	10.06	4.96
	Cell	Air	1.60	1.94	0	4.44
		Air-CO ₂	0.70	3.39	0	4.08
Sandstone (15-week pooled) ²	Column	Air	12.55	10.66	13.78	10.54
		Air-CO ₂	18.53	21.35	28.08	19.25
	Cell	Air	28.34	26.04	58.43	5.61
		Air-CO ₂	21.11	25.08	25.93	24.60

¹ RPD between duplicate samples is determined as $RPD = [(2A - B2)/(A + B)] \times 200$.

² 15-week Pooled RPDs are determined as the square root of the average squared weekly (Weeks 1 - 15) RPDs for each parameter

Out of thirty-two pooled RPD results, only four were above 28% (see shaded cells in Table 2.4). Pooled RPDs for alkalinity in duplicate shale samples ranged from 28.2 to 41.9%. Because alkalinity production is directly related to the presence of O₂ and CO₂, it is possible that the gas flows through the systems containing these duplicate shale samples were not identical.

statistical comparison of gas mixtures: Statistical comparisons between samples exposed to air-only and CO₂-enhanced gas mixtures were determined using paired t-tests. For each parameter, sample type, method type, and week, the difference was calculated between the mean of the two log transformed results for samples exposed to CO₂-enhanced air and the mean of the two log transformed results for samples exposed to air-only conditions. The mean of the weekly differences was then calculated for each parameter, sample and method type, and the paired t-tests were run to determine whether the mean of the differences was significantly greater or less than 0. A mean significantly greater than 0 suggests that the CO₂-enhanced gas type yields higher results than the air only gas type, while a mean significantly less than 0 suggests that the CO₂-enhanced gas type yielded significantly lower results than the air-only gas type.