

PF3) 오존가스와 염화나트륨의 반응으로부터 과염소산의 생성에 미치는 환경조건의 영향

Impacts of Environmental Conditions on Perchlorate Generation from Gaseous Ozone Reactions with Multiphase Sodium Chloride

강남구^{1,2)} · W.A. Jackson²⁾ · T.A. Anderson³⁾ · P.K. Dasgupta⁴⁾

¹⁾한국표준과학연구원(KRISS) 삶의질표준부, ²⁾Dept. of Civil & Environmental Engineering, ³⁾Dept. of Environmental Toxicology, Texas Tech University,

⁴⁾Dept. of Chemistry & Biochemistry, University of Texas at Arlington

1. 서 론

While there has been a substantial research effort in understanding the occurrence, remediation, and impact of perchlorate(ClO_4^-) in the environment, scant research has been conducted on chemical processes associated with ClO_4^- formation(Kang et al., 1996; Dasgupta et al., 1995). No information is available concerning the influence of process variables and reaction phase on ClO_4^- formation efficiency. The overall objective of this research effort was to determine the potential impacts of environmental variables on perchlorate production from NaCl. While these experiments do not represent natural conditions as ozone(O_3) concentrations were much greater(0.96%) than tropospheric, (10 to 30ppbv), the results provide implications on the potential role of O_3 in natural systems for ClO_4^- formation.

2. 연구 방법

Table 1. Production of ClO_4^- and other ions from Cl^- was investigated in multiphase systems under various experimental conditions at ambient temperature.

Trial ID	F1			F2 (NaOH)			
	Cl^- (mg)	Sand (g)	Water (g)	Initial pH	X Conc. (N)	Y Vol. (mL)	Initial pH
D-MCCS	63.7	5	0	6.3	0.1	100	13.0
D-MCCB	63.7	0	0	6.3	0.1	100	13.0
D-LCHS	0.75	100	0	6.0	0.001	50	10.0
W-MC-A	100	0	100	6.5	0.1	100	13.0
W-MC-B	100	0	100	6.5	0.1	100	13.0
C-LCHS	0.75	100	25	6.0	0.001	50	10.0
C-HCHS	2500	100	50	6.7	0.1	50	13.0

Abbreviations: D-MCCS = dry, medium level of Cl^- coated onto silica sand; D-MCCB = dry, medium level of Cl^- coated onto the inner surface of borosilicate flask; D-LCHS = dry, low level of Cl^- coated onto high amount of silica sand; W-MC-A = wet, medium level of aqueous Cl^- solution, gaseous ozone exposed "above" the solution W-MC-B = wet, medium level of aqueous Cl^- solution, gaseous ozone injected "below" the solution; C-LCHS = combined, low level of aqueous Cl^- solution in the presence of high amount of silica sand; C-HCHS = combined, high level of aqueous Cl^- solution in the presence of high amount of silica sand.

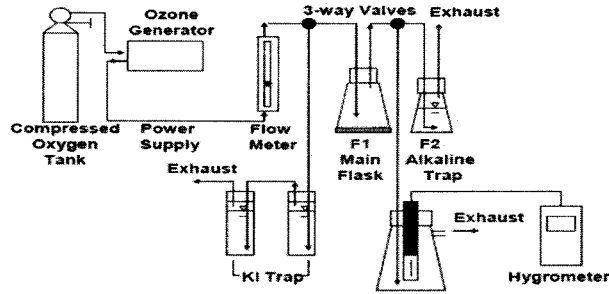


Fig. 1. Experimental apparatus for O₃ reaction with NaCl coated sand.

3. 결과 및 고찰

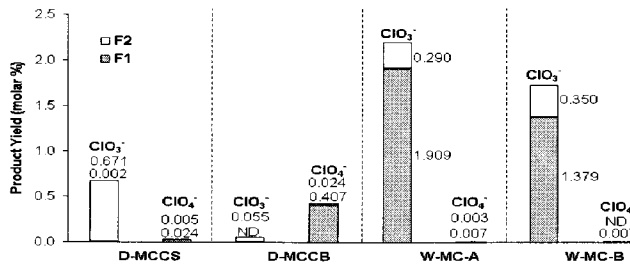


Fig. 2. ClO₃⁻ and ClO₄⁻ total molar yields for aqueous and non-aqueous systems.

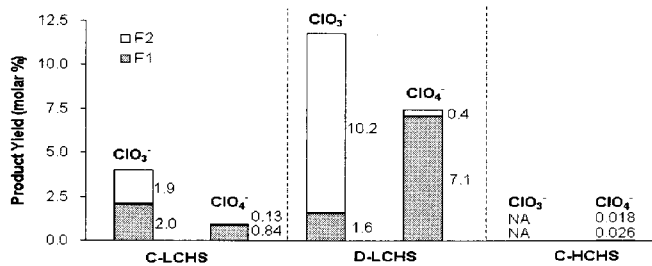


Fig. 3. Impact of initial Cl concentrations on ClO₃⁻ and ClO₄⁻ total molar yields.

참고 문헌

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