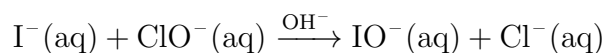# Chapter 11 − Practice FRQ

Michael Brodskiy

Instructor: Mr. Morgan

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3. Answer the following questions related to the kinetics of chemical reactions.

$$I^-(aq) + ClO^-(aq) \xrightarrow{OH^-} IO^-(aq) + Cl^-(aq)$$

Iodide ion, I^-, is oxidized to hypoiodite ion, IO^-, by hypochlorite, ClO^-, in a basic solution according to the equation above. Three initial-rate experiments were conducted; the results are shown in the following table.

Experiment	$[I^-]$	$[ClO^-]$	Initial Rate
1	0.017	0.015	0.156
2	0.052	0.015	0.476
3	0.016	0.061	0.596

(a) Determine the order of the reaction with respect to each reactant listed below. Show your work.

　　i. $I^-(aq)$

$$\frac{156}{476} = \left(\frac{17}{52}\right)^m \tag{1}$$
$$m = 1$$

　　ii. $ClO^-(aq)$

$$\frac{156}{596} = \frac{17}{16} \cdot \left(\frac{15}{61}\right)^n \tag{2}$$
$$n = 1$$

(b) For the reaction,

　　i. write the law that is consistent with the calculations in part (a);

$$rate = k[I^-(aq)][ClO^-(aq)] \tag{3}$$

ii. calculate the value of the specific rate constant, k, and specify units.

$$.596 = k\,(.016)\,(.061)$$

$$\frac{.596}{.016 \cdot .061} = 610.66 \left[\frac{1}{M\,s}\right] \tag{4}$$