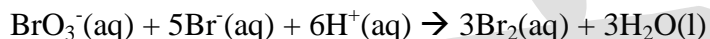


第 14 題:

The following set of data was obtained by the method of initial rates for the reaction:

Calculated the initial rate when  $\text{BrO}_3^-$  is 0.30 M,  $\text{Br}^-$  is 0.050 M, and  $\text{H}^+$  is 0.15 M

Expt	$[\text{BrO}_3^-]$ (M)	$[\text{Br}^-]$ (M)	$[\text{H}^+]$ (M)	Rate (M/s)
1	0.10	0.10	0.10	$8.0 \times 10^{-4}$
2	0.20	0.10	0.10	$1.6 \times 10^{-3}$
3	0.20	0.15	0.10	$2.4 \times 10^{-3}$
4	0.10	0.10	0.25	$5.0 \times 10^{-3}$

(A)  $6.1 \times 10^{-5}$  M/s (B)  $2.7 \times 10^{-3}$  M/s (C)  $5.3 \times 10^{-3}$  M/s (D)  $8.4 \times 10^{-2}$  M/s

ANS: (B)

$$r = k[\text{BrO}_3^-][\text{Br}^-][\text{H}^+]^2$$

$$k = 8 \quad r = 8 \times 0.30 \times 0.050 \times (0.15)^2 = 2.7 \times 10^{-3}$$

## 【精選範例】



	$\text{BrO}_3^-$ mol/L	$\text{Br}^-$ mol/L	$\text{H}^+$ mol/L	Rate
1	0.10	0.10	0.10	$8.0 \times 10^{-4}$
2	0.20	0.10	0.10	$1.6 \times 10^{-3}$
3	0.20	0.20	0.10	$3.2 \times 10^{-3}$
4	0.10	0.10	0.20	$3.2 \times 10^{-3}$

$$\text{Rate} = k[\text{BrO}_3^-]^n[\text{Br}^-]^m[\text{H}^+]^p$$

$$\text{Rate}_2/\text{Rate}_1 = (1.6 \times 10^{-3})/(8.0 \times 10^{-4}) = \frac{k(0.20)^n(0.10)^m(0.10)^p}{k(0.10)^n(0.10)^m(0.10)^p}$$

$$2 = 2^n, n = 1$$

$$\text{Rate}_4/\text{Rate}_1 = (3.2 \times 10^{-3})/(8.0 \times 10^{-4}) = 4 = \frac{k(0.10)^n(0.10)^m(0.20)^p}{k(0.10)^n(0.10)^m(0.10)^p}$$

$$4.0 = (2.0)^p, p = 2$$

同理 Rate3/Rate2  $\rightarrow$  m = 1

$$\text{Rate} = k[\text{BrO}_3^-][\text{Br}^-][\text{H}^+]^2$$

$$8.00 \times 10^{-4} \text{ mol L}^{-1}\text{s}^{-1} = k(0.10 \text{ mol/L})(0.10 \text{ mol/L})(0.10 \text{ mol/L})^2$$

$$k = 8.00 \text{ L}^3 \text{ mol}^{-3}\text{s}^{-1}$$

普化講義第四冊, p.56

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