Supplementary Material: Data and Figures

1 Tables

1.1 Table 1: Values of observed rate constant (k) correspondence to pH for KBr-KBrO3 (k_1) and NBS-KBr (k_2) systems at 27°C

pH	k_1 $(10^{-4})(M^{-1}s^{-1})$	k_2 $(10^{-4})(M^{-1}s^{-1})$
3	37.03	721.5
4	25.64	529.9
5	16.67	347.2
6	10.26	241.5
7	6.27	150.15
8	4.27	102.9
9	2.73	73.9
10	1.97	54.4

1.2 Table 2: Calculated Activation Energy (E_a) vs pH for KBr-KBrO3 System

pH	E_a (J/mol) at 303 K	E_a (J/mol) at 315 K
3	45387	50139
4	46459	51269
5	47532	52398
6	48605	53528
7	49677	54658
8	50750	55787
9	51823	56917
10	52896	58046

1.3 Table 3: Calculated Activation Energy (E_a) vs pH for NBS-KBr System

pH	E_a (J/mol) at 300 K	E_a (J/mol) at 319 K
3	47542	52029
4	48553	53113
5	49565	54197
6	50577	55281
7	51588	56365
8	52600	57448
9	53611	58532
10	54623	59616

2 Figures

2.1 Figure 1: Rate Constant (k_1) vs pH for KBr-KBrO3 at 27°C

2.2 Figure 2: Rate Constant (k_2) vs pH for NBS-KBr at 27°C

2.3 Figure 3: Calculated Activation Energy vs. pH for KBr-KBrO3 System

2.4 Figure 4: Calculated Activation Energy vs. pH for NBS-KBr System

2.5 Figure 5: Log-log plot showing regression analysis of rate constant vs [H+]

3 Key Data and Equations

- Empirical exponential decay function for rate constant vs. pH: $k = a \cdot e^{-b \cdot pH}$
- KBr-KBrO3 system fitting parameters: $a \approx 0.0133$, $b \approx 0.427$
- NBS-KBr system fitting parameters: $a \approx 0.2639$, $b \approx 0.406$
- Arrhenius Equation: $k = A \cdot e^{-\frac{E_a}{RT}}$
- Relationship between Activation Energy and pH: $E_a = (bRT) \cdot pH + RT \cdot ln(\frac{A}{a})$
- Fractional kinetic order relationship: $rate \approx k''[C_6H_5OH][Brominating\ Species]_{total}[H^+]^{0.18}$

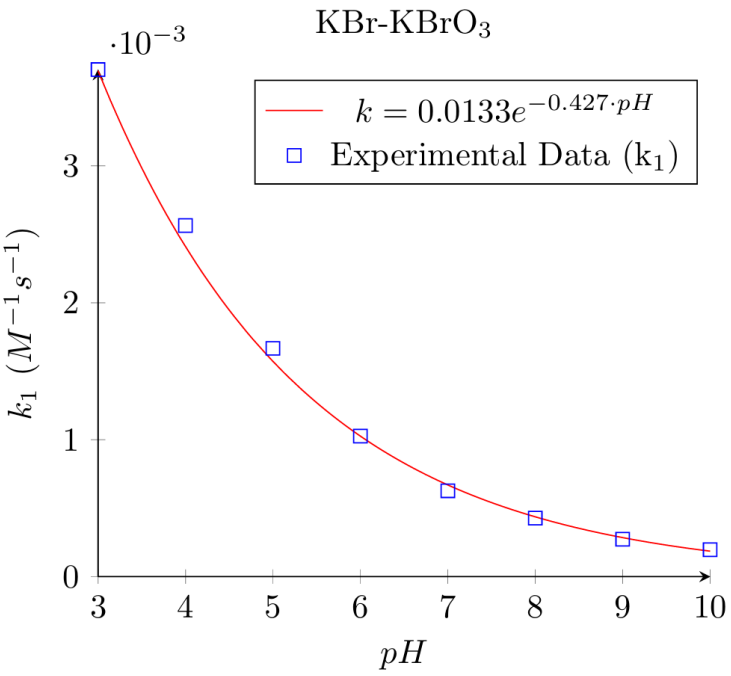

Figure 1: Rate Constant (k_1) vs pH for KBr-$KBrO_3$ at 27°C

Figure 1: Enter Caption

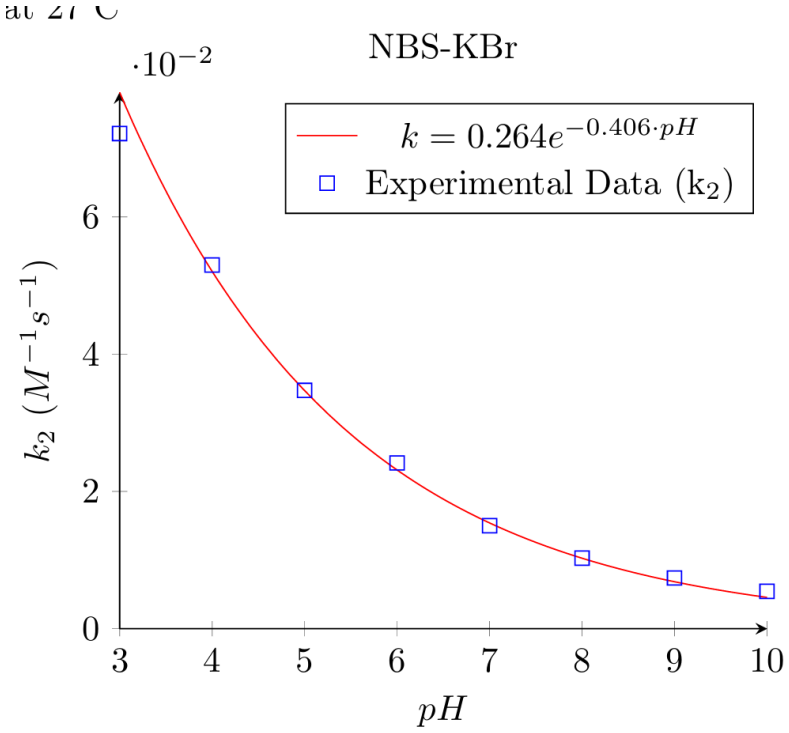

Figure 2: Enter Caption

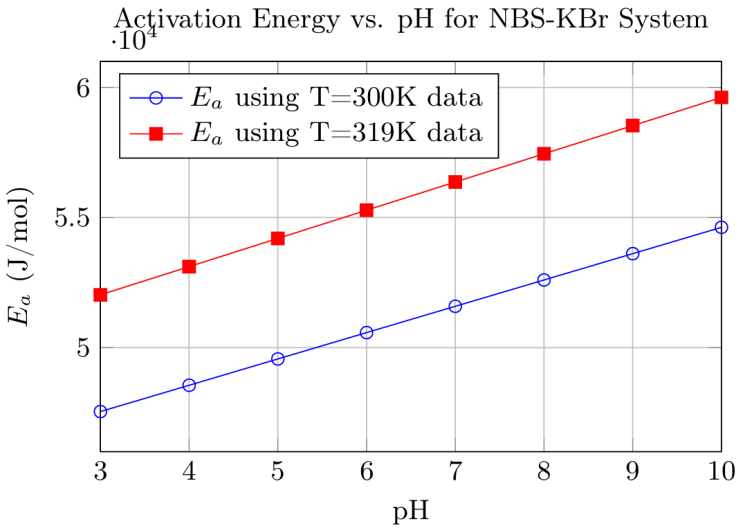

Figure 3: Enter Caption

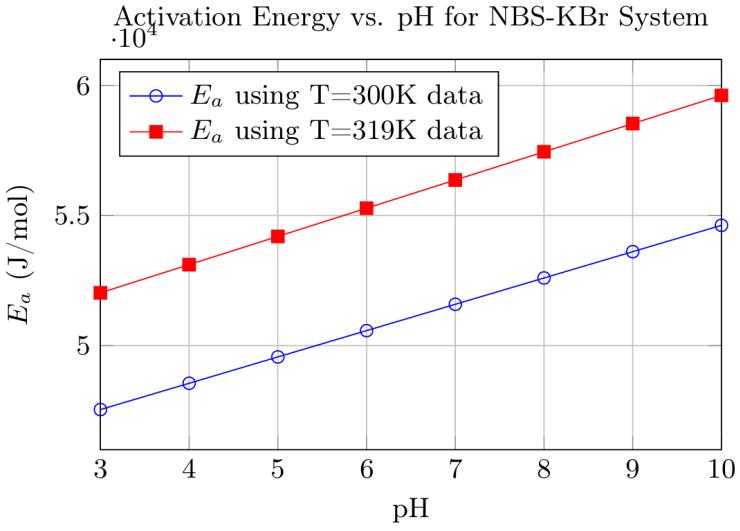

Figure 4: Enter Caption

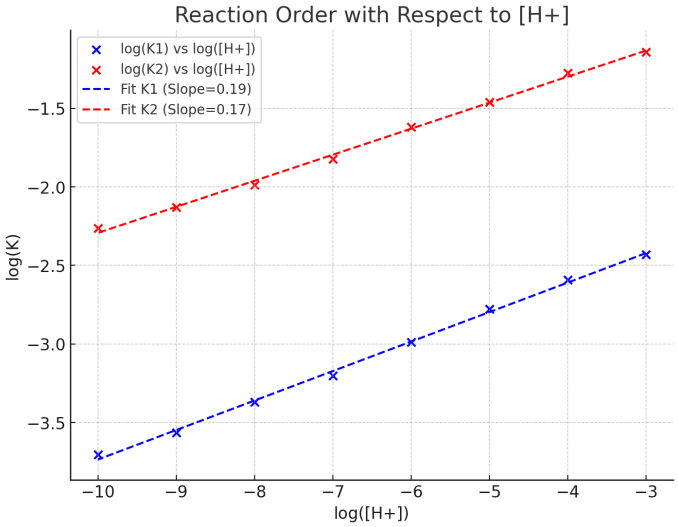

Figure 5: Enter Caption