

Name Key (print) Name _____ (sign)

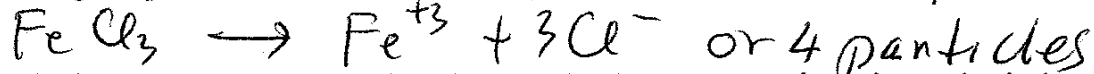
Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1. How many grams of NaCl is dissolved in 30.5 mL of a 0.100 M water solution? (FW NaCl = 58.5 g/mol) (6 pts)

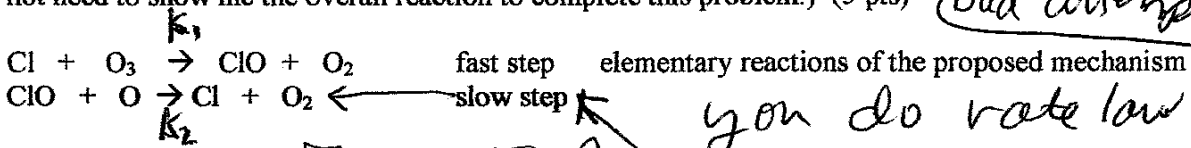
bad attempt -4

$$30.5 \text{ mL} \times \frac{0.100 \text{ mol NaCl}}{1000 \text{ mL NaCl}} \times \frac{58.5 \text{ g NaCl}}{1 \text{ mol NaCl}} = 0.178 \text{ g NaCl}$$

2. In freezing point depression and boiling point elevation, if you use FeCl₃ as the dissolved substance, assuming complete dissociation, what is the i (Van't Hoff factor)? (3 pts) 4



3. For the following reaction mechanism shown as the elementary reactions given, what is the rate law? (You do not need to show me only reactants of the overall reaction to complete this problem. You do not need to show me the overall reaction to complete this problem.) (5 pts) *bad attempt -3*

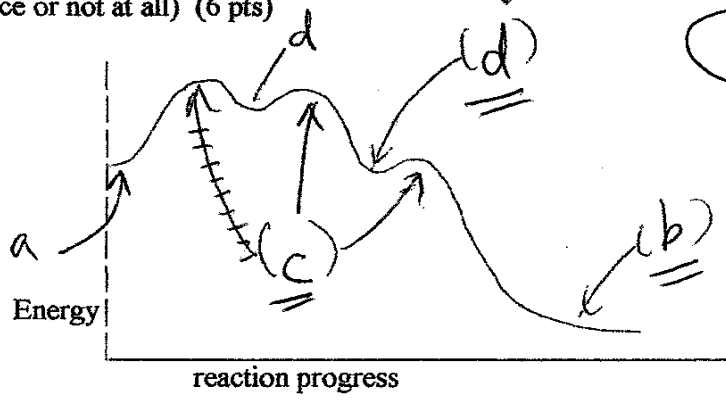


$$\text{rate} = k_2 [\text{ClO}] [\text{O}]$$

you do rate law for rate determining slow step

rate for overall rxn -2 1/2
added -2

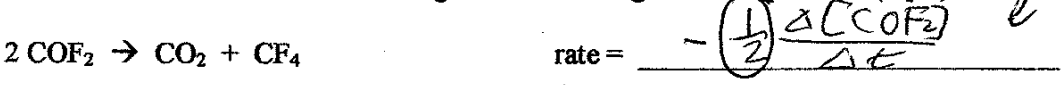
4. For the following energy vs. reaction progress diagram, match the blanks with the appropriate terms. (a) reactant (b) product (c) transition state (d) intermediate (Each term may be used once, more than once or not at all) (6 pts)



2pt each

wrong -1
General
wrong molecule -1 1/2
 $\frac{1}{a} \frac{\Delta A}{\Delta t}$

Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta[A] / \Delta t$ for the molecule COF₂. Don't forget the correct sign of the equation. (3 pts)



$$aA + bB \rightarrow cC + dD$$

$$\text{rate} = -\frac{1}{a} \frac{\Delta[A]}{\Delta t} = -\frac{1}{b} \frac{\Delta[B]}{\Delta t} = +\frac{1}{c} \frac{\Delta[C]}{\Delta t}$$

$$= \frac{1}{d} \frac{\Delta[D]}{\Delta t}$$

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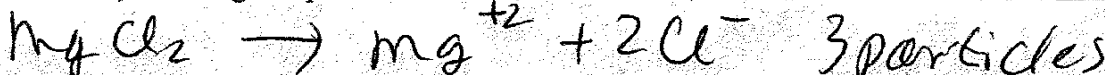
1. How many grams of KI is dissolved in 30.5 mL of a 0.255 M water solution? (FW KI = 165.9 g/mol) (6 pts)

bad attempt -4

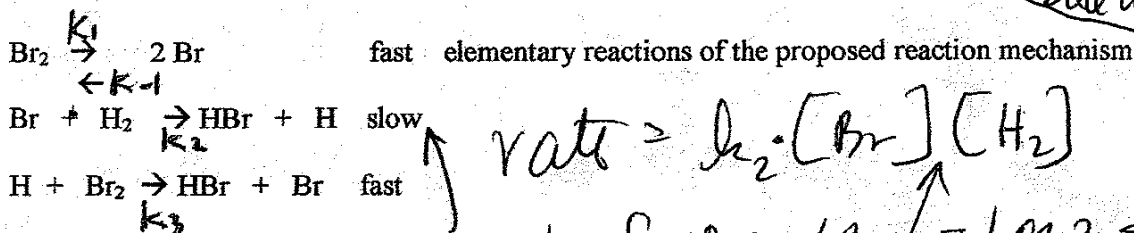
$$30.5 \text{ mL KI solution} \times \frac{0.255 \text{ mol KI}}{1000 \text{ mL KI solution}} \times \frac{165.9 \text{ g KI}}{1 \text{ mol KI}} = 1.29 \text{ g KI}$$

2pt math 1

2. In freezing point depression and boiling point elevation, if you use MgCl₂ as the dissolved substance, assuming complete dissociation, what is the i (Van't Hoff factor)? (3 pts) 3



3. For the following reaction mechanism shown as the elementary reactions given, what is the rate law? (You do not need to show me only reactants of the overall reaction to complete this problem. You do not need to show me the overall reaction to complete this problem.) (5 pts)



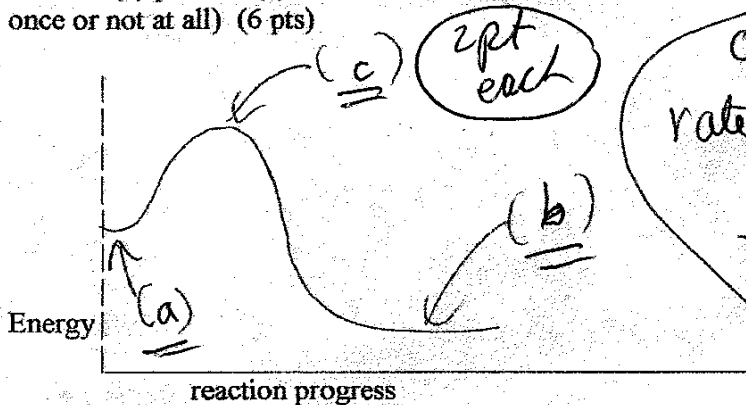
rate = k₂[Br][H₂]

rate law is only from the slow step

rate for overall rxn -2 1/2

added -2

4. For the following energy vs. reaction progress diagram, match the blanks with the appropriate terms. (a) reactant (b) product (c) transition state (d) intermediate (Each term may be used once, more than once or not at all) (6 pts)



$$aA + bB \rightarrow cC + dD$$

$$\text{rate} = -\frac{1}{a} \frac{\Delta[A]}{\Delta t} = -\frac{1}{b} \frac{\Delta[B]}{\Delta t} + \frac{1}{c} \frac{\Delta[C]}{\Delta t} = +\frac{1}{d} \frac{\Delta[D]}{\Delta t}$$

Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta[A]/\Delta t$ for the molecule CO₂. Don't forget the correct sign of the equation. (3 pts)

$$2 \text{ COF}_2 \rightarrow \text{CO}_2 + \text{CF}_4 \quad \text{rate} = + \frac{\Delta[\text{CO}_2]}{\Delta t}$$

*wrong molecule -1/2 or general 1/a * Δ[A]/Δt*

wrong # -1

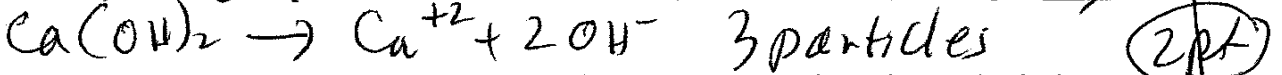
Name Key (print) Name bad attempt -4 (sign)

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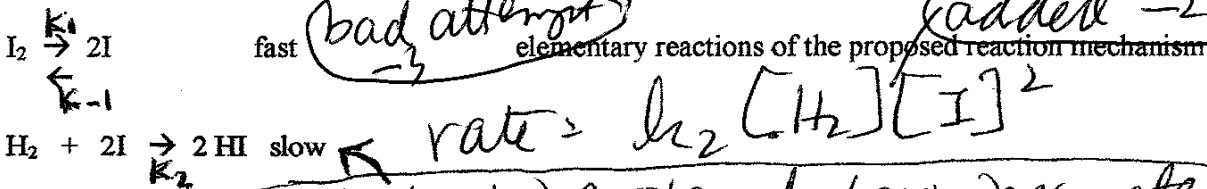
1. What is the molality of a solution made by dissolving 22.7 grams of ethanol (FW ethanol = 46.08 g/mol) in 355 grams of water (assume density water = 1.00 g/1.00 mL)? (6 pts)

molality = $\frac{\# \text{ moles solute}}{\text{kg solvent}}$ # moles = $\frac{22.7 \text{ g}}{46.08 \text{ g/mol}}$
 $\text{kg} = 355 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 0.355$ # moles = 0.493
 $m = 0.493 / 0.355 = 1.39$

2. In freezing point depression and boiling point elevation, if you use Ca(OH)₂ as the dissolved substance, assuming complete dissociation, what is the i (Van't Hoff factor)? (3 pts)

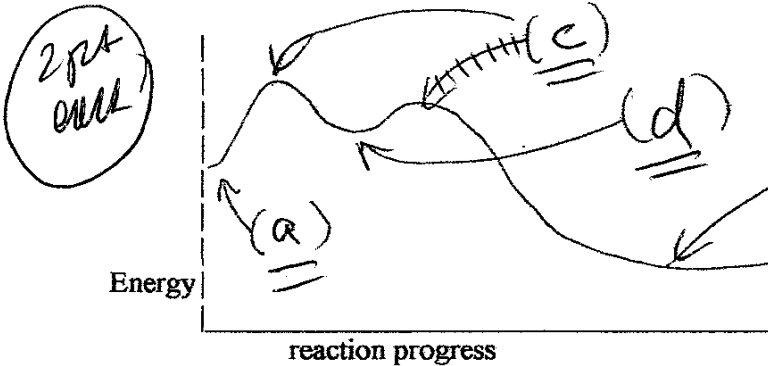


3. For the following reaction mechanism shown as the elementary reactions given, what is the rate law? (You do not need to show me only reactants of the overall reaction to complete this problem. You do not need to show me the overall reaction to complete this problem.) (5 pts)



only rate determining step determines rate
 slow step rate for overall rxn

4. For the following energy vs. reaction progress diagram, match the blanks with the appropriate terms. (a) reactant (b) product (c) transition state (d) intermediate (Each term may be used once, more than once or not at all) (6 pts)



$a\text{A} + b\text{B} \rightarrow c\text{C} + d\text{D}$

rate = $-\frac{1}{a} \frac{\Delta[\text{A}]}{\Delta t} = \frac{1}{b} \frac{\Delta[\text{B}]}{\Delta t}$
 $= \frac{1}{c} \frac{\Delta[\text{C}]}{\Delta t} = \frac{1}{d} \frac{\Delta[\text{D}]}{\Delta t}$

Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta[\text{A}]/\Delta t$ for the molecule **BrNO** Don't forget the correct sign of the equation. (3 pts)



rate = $-\frac{\Delta[\text{BrNO}]}{2\Delta t}$

wrong # -1 wrong molecule or $\frac{1}{a} \frac{\Delta[\text{A}]}{\Delta t}$

Name Key (print) Name _____ (sign)

Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

1. What is the molality of a solution made by dissolving 78.7 grams of methanol (FW methanol = 32.05 g/mol) in 355 grams of water (assume density water = 1.00 g/mL)? (6 pts)

bad attempt - 4

$$m = \frac{\# \text{ moles solute}}{\text{kg solvent}}$$

$$\# \text{ moles} = 78.7 \text{ g} \times \frac{1 \text{ mol}}{32.05 \text{ g}} = 2.46 \text{ moles}$$

$$\# \text{ kg} = 355 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 0.355 \text{ kg}$$

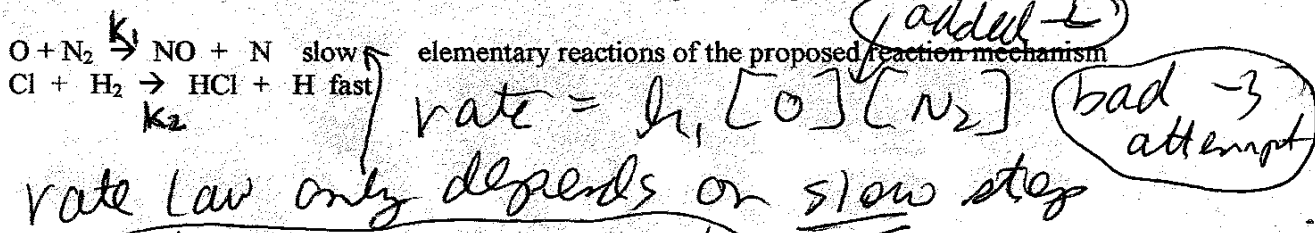
$$m = \frac{2.46 \text{ mole}}{0.355 \text{ kg}} = 6.93 \text{ m}$$

2pt

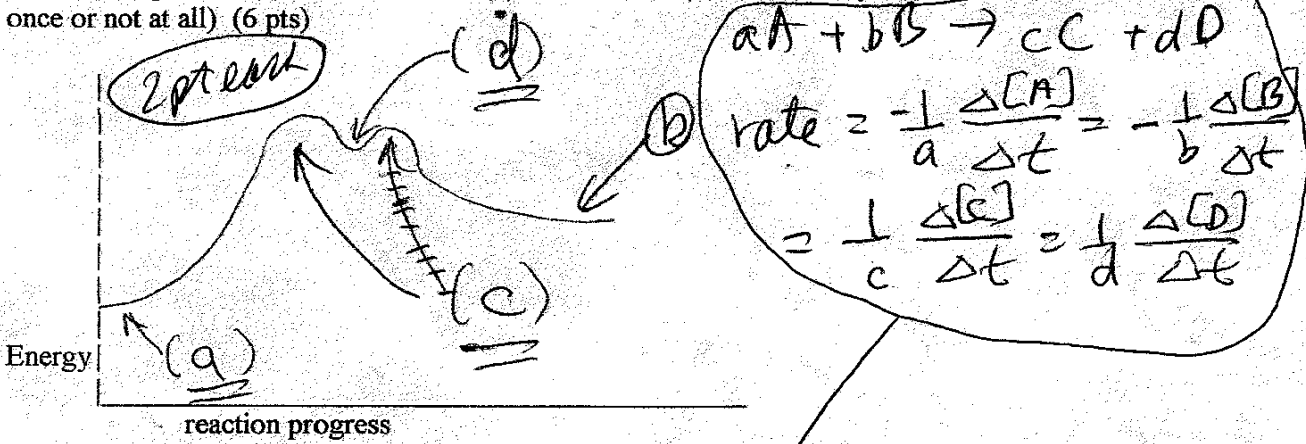
2. In freezing point depression and boiling point elevation, if you use CaCl₂ as the dissolved substance, assuming complete dissociation, what is the i (Van't Hoff factor)? (3 pts)



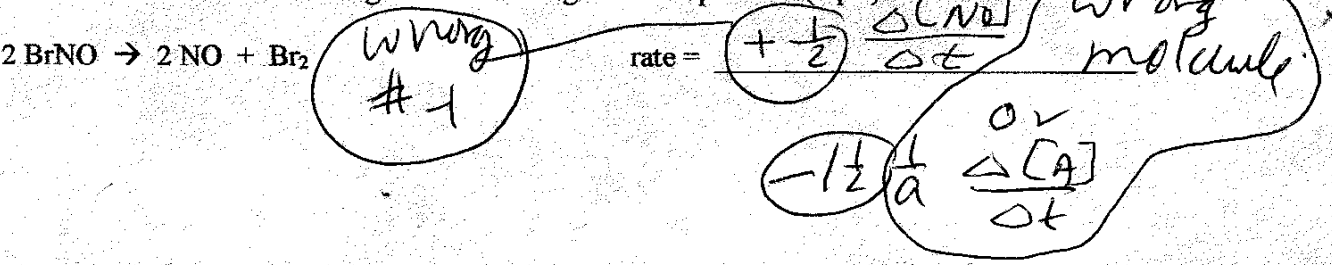
3. For the following reaction mechanism shown as the elementary reactions given, what is the rate law? (You do not need to show me only reactants of the overall reaction to complete this problem. You do not need to show me the overall reaction to complete this problem.) (5 pts)



4. For the following energy vs. reaction progress diagram, match the blanks with the appropriate terms. (a) reactant (b) product (c) transition state (d) intermediate (Each term may be used once, more than once or not at all) (6 pts)



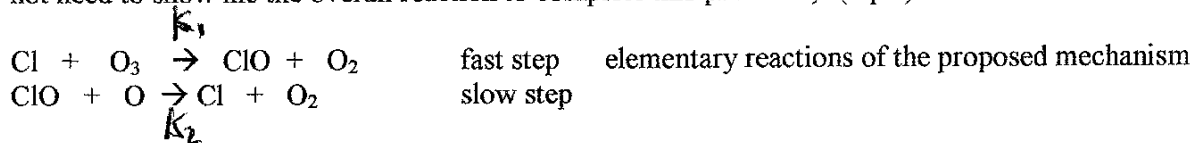
Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta[A]/\Delta t$ for the molecule NO Don't forget the correct sign of the equation! (3 pts)



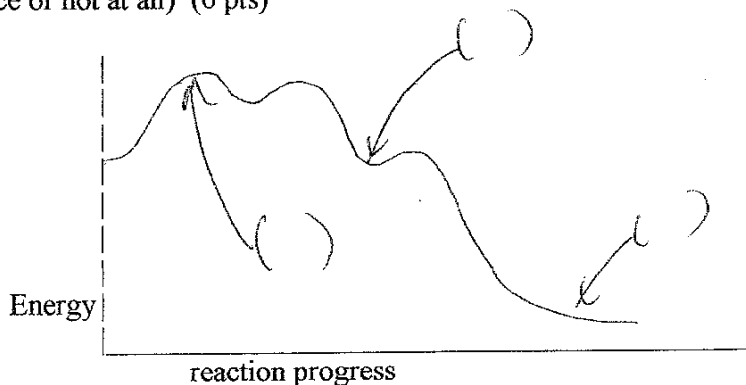
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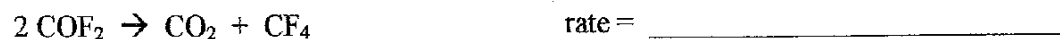
- How many grams of NaCl is dissolved in 30.5 mL of a 0.100 M water solution ? (FW NaCl = 58.5 g/mol) (6 pts)
- In freezing point depression and boiling point elevation, if you use FeCl₃ as the dissolved substance, assuming complete dissociation, what is the i (Van't Hoff factor) ? (3 pts) _____
- For the following reaction mechanism shown as the elementary reactions given, what is the rate law? (You do not need to show me only reactants of the overall reaction to complete this problem. You do not need to show me the overall reaction to complete this problem.) (5 pts)



- For the following energy vs. reaction progress diagram, match the blanks with the appropriate terms. (a) reactant (b) product (c) transition state (d) intermediate (Each term may be used once, more than once or not at all) (6 pts)



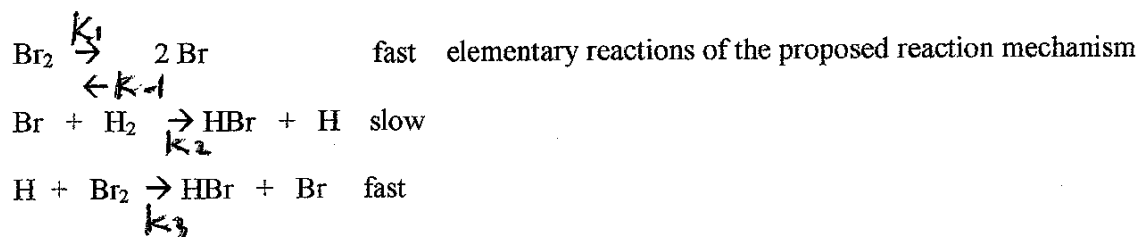
Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta [A] / \Delta t$ for the molecule **COF₂** Don't forget the correct sign of the equation. (3 pts)



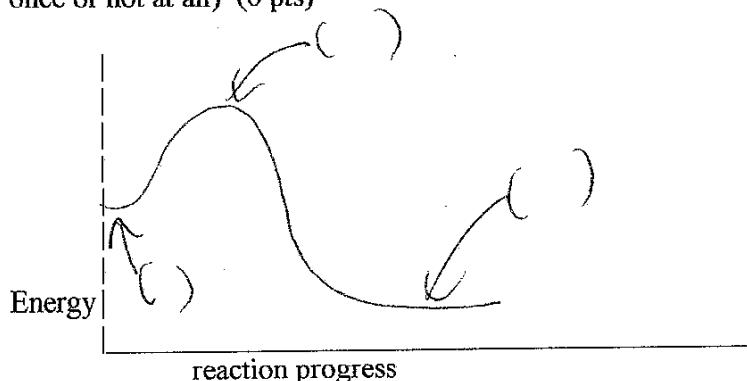
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Please show all work for full credit & to get partial credit. (suggestion: A guess is better than no answer.)

- How many grams of KI is dissolved in 30.5 mL of a 0.255 M water solution? (FW KI = 165.9 g/mol) (6 pts)
- In freezing point depression and boiling point elevation, if you use $MgCl_2$ as the dissolved substance, assuming complete dissociation, what is the i (Van't Hoff factor)? (3 pts) _____
- For the following reaction mechanism shown as the elementary reactions given, what is the rate law? (You do not need to show me only reactants of the overall reaction to complete this problem. You do not need to show me the overall reaction to complete this problem.) (5 pts)



- For the following energy vs. reaction progress diagram, match the blanks with the appropriate terms. (a) reactant (b) product (c) transition state (d) intermediate (Each term may be used once, more than once or not at all) (6 pts)



Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta [A] / \Delta t$ for the molecule CO_2 Don't forget the correct sign of the equation. (3 pts)

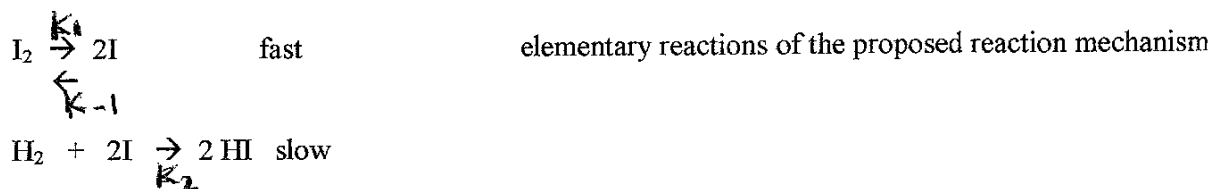


rate = _____

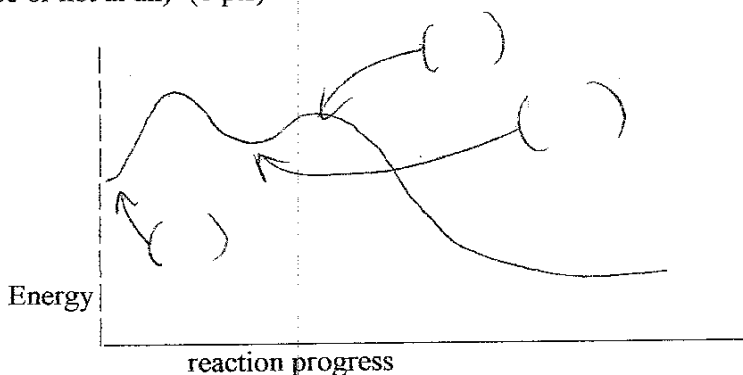
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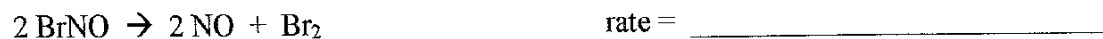
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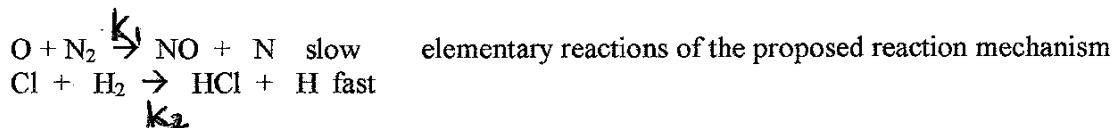
Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta[A] / \Delta t$ for the molecule **BrNO** Don't forget the correct sign of the equation. (3 pts)



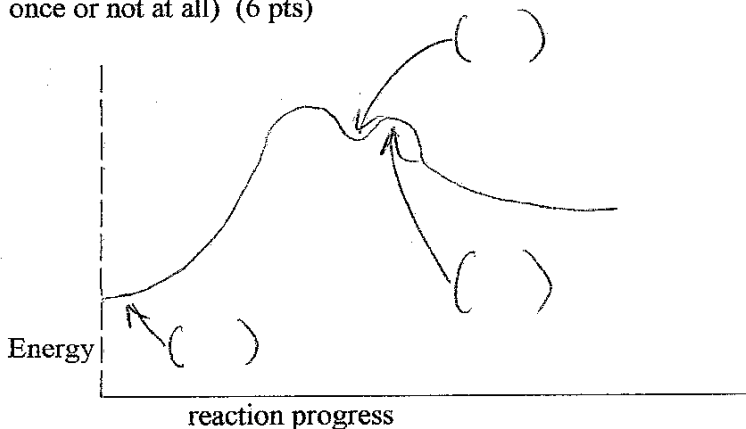
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Extra Credit: For the reaction shown, what is the rate of the reaction written in the form $\Delta [A] / \Delta t$ for the molecule **NO** Don't forget the correct sign of the equation. (3 pts)

