1. Show all fundamental steps for the mechanism of the following three reactions.



1. Show all fundamental steps for the mechanism of the following reaction.



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1. Show possible tautomers when pyrrole is protonated. Which one is most stable?
2. Show all fundamental steps the mechanism of the following reaction.



1. How does the solvent affect rates of nucleophilic substitution?
2. Which is faster in each pair? Explain.



1. Show all fundamental steps for the mechanism of the following reaction.



1. Explain the trends for solvolysis in 80% aqueous acetone at 25 C.



|  |  |
| --- | --- |
| R | k |
| CH3 | 1.4 x 10-10 |
| CH3CH2 | 1.1 x 10-9 |
| (CH3)2CH | 5.0 x 10-9 |
| (CH3)3C | 3.4 x 10-5 |
| (CH3)3CCH2 | 1.5 x 10-9 |

1. Explain the following trends in relative rates



|  |  |
| --- | --- |
| n | krel |
| 1 | 3.3 x 104 |
| 2 | 1.5 x 102 |
| 3 | 1.0 |
| 4 | 1.3 x 102 |
| 5 | 4.3 |

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1. Show all fundamental steps for the mechanism of the following reactions.



1. a. Which alkyl halide is most reactive in a protic polar solvent like methanol?

b. in aprotic polar solvent?



1. Which ion, F-, Cl-, Br-, or I-, is the strongest nucleophile in water? In DMSO?
2. Show all fundamental steps for the mechanism of the following reactions.

