CONCEPT: METAL ION CATALYSIS

Types of Metal Ion Catalysis

● Metal ions (___ or ___) act as catalysts by forming _____ with the lone pair of an electron-rich atom.

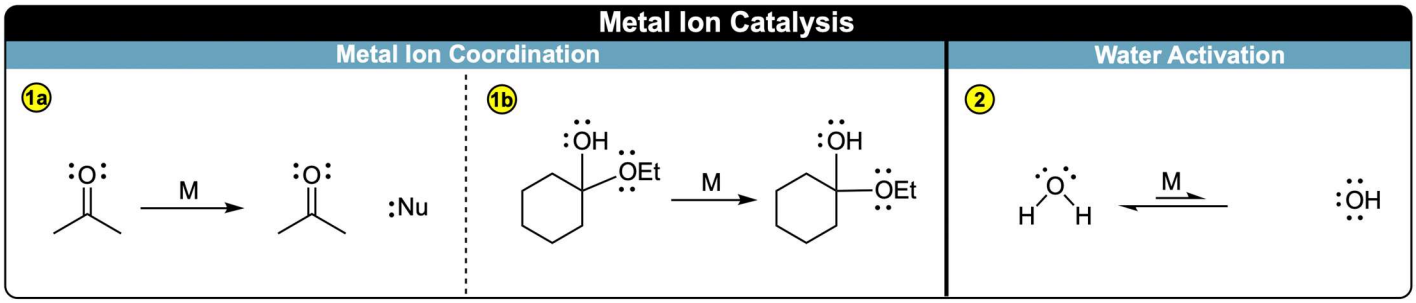
□ The metal ion can increase the rate of a reaction by ___ factors:

(1) **Metal Ion Coordination:** Metal ion acts like a _____.

a) Makes the carbonyl ___ more reactive towards nucleophilic attack.

b) _____ the leaving group once it's kicked out.

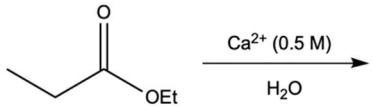
(2) **Water Activation:** metal ion ___ rate of hydrolysis of water, turning it into a _____ nucleophile.

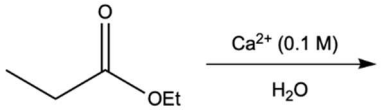


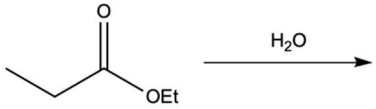
EXAMPLE: After activation with Co^{2+}, which of the following compounds will undergo nucleophilic addition with the cyanide ion at the fastest rate?

I II III IV

PRACTICE: Predict which of the following reactions with ethyl propionate would undergo hydrolysis the fastest.

a) 

b) 

c) 

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