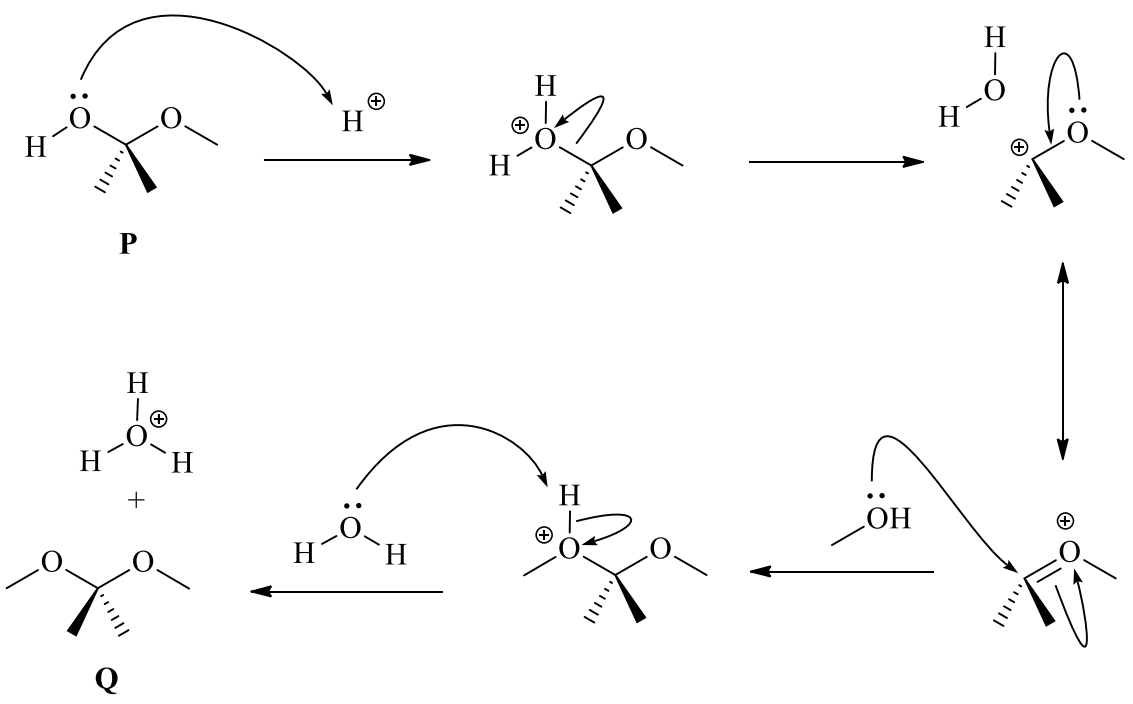
- A step-by-step mechanism for the formation of an acetal from a hemiacetal is outlined below. Demonstrate your understanding of reaction mechanisms by adding curly arrows to complete this mechanism.
  Note: you don't need to have seen this mechanism before to answer this question.

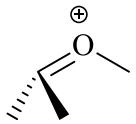
Marks 5



Overall, what type of reaction (**P** → **Q**) is shown here?

Substitution

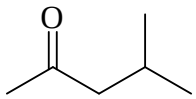
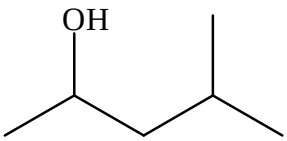
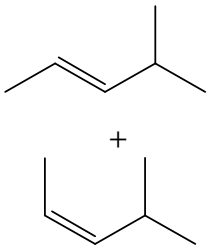
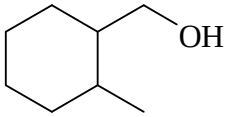
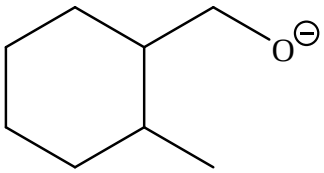
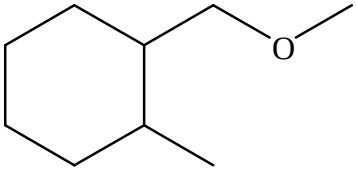
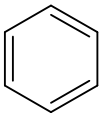
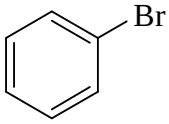
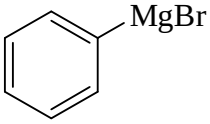
Identify one nucleophile and one electrophile in the scheme above.

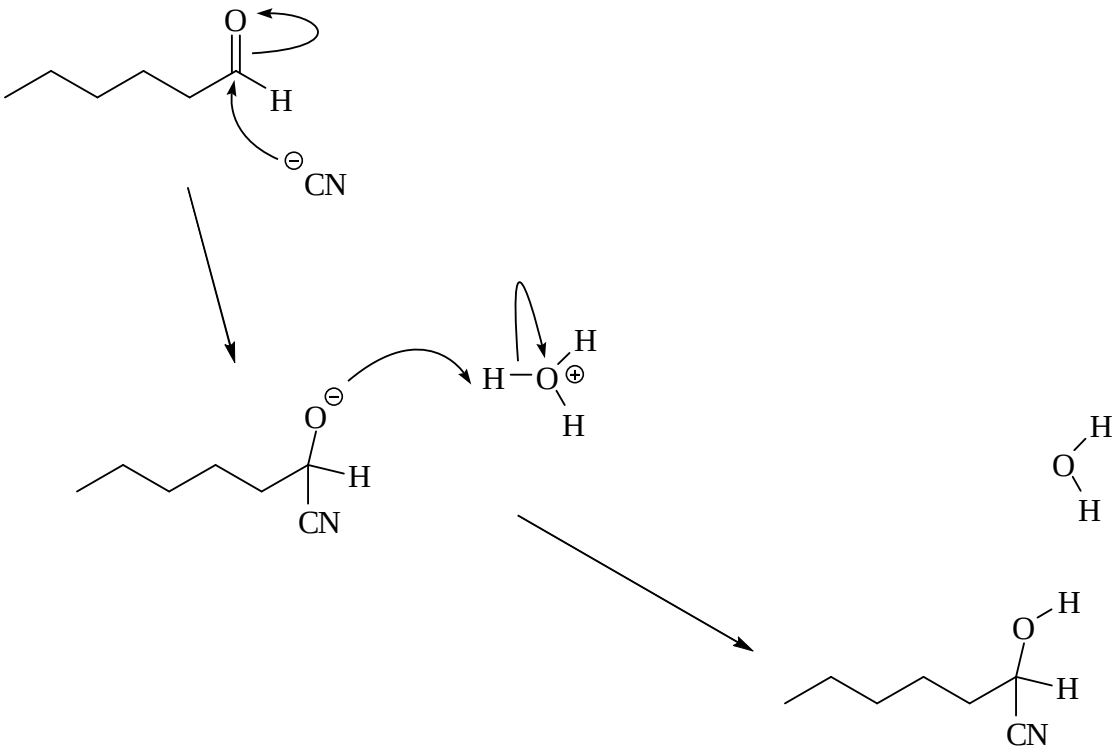
nucleophile	electrophile
H_2O or CH_3OH	$H^{\oplus}$ or 

THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY.

Marks 6

- Complete the following table by drawing the structures of the intermediate and final organic product(s) as required. The intermediate product is formed when the starting material is treated with Reagent 1. The final product is formed when the intermediate product is treated with Reagent 2.

Starting material	Intermediate product	Final product
	Reagent 1: $NaBH_4$ then H_2O 	Reagent 2: conc. H_2SO_4 
	Reagent 1: CH_3MgBr 	Reagent 2: CH_3I 
	Reagent 1: Br_2 / $FeBr_3$ (cat.) 	Reagent 2: Mg / dry ether 

- Apply your understanding of curly arrows to propose a mechanism for the following reaction.

Marks 3