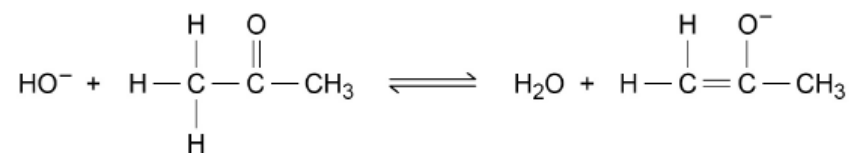


## Unfamiliar mechanisms

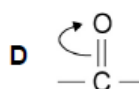
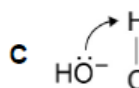
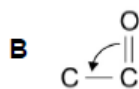
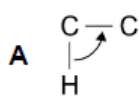
2 1

In concentrated alkali, propanone reacts with hydroxide ions to form an equilibrium mixture as shown.



Which curly arrow does **not** appear in the mechanism of this reaction?

[1 mark]



Answer: B

0 4 . 3 A mixture of concentrated nitric acid and concentrated sulfuric acid reacts with benzene.

Figure 4 shows the incomplete mechanism for this reaction.

Name the mechanism.

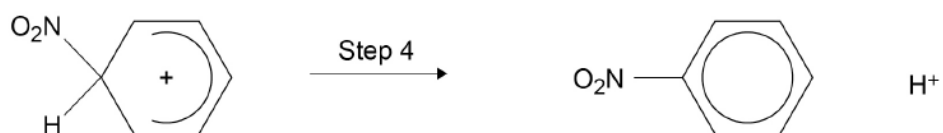
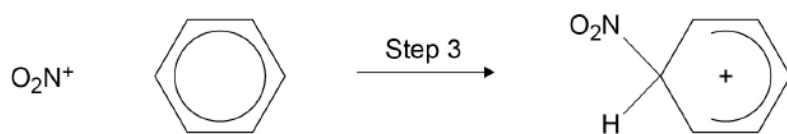
Complete the mechanism in Figure 4 by adding

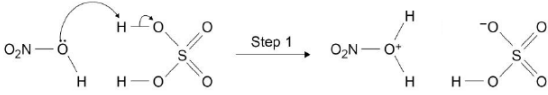

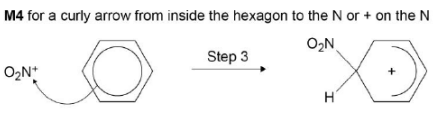
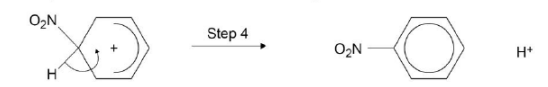
- any lone pairs of electrons involved in each step
- two curly arrows in step 1
- a curly arrow in step 2
- a curly arrow in step 3
- a curly arrow in step 4.

[5 marks]

Name of mechanism \_\_\_\_\_

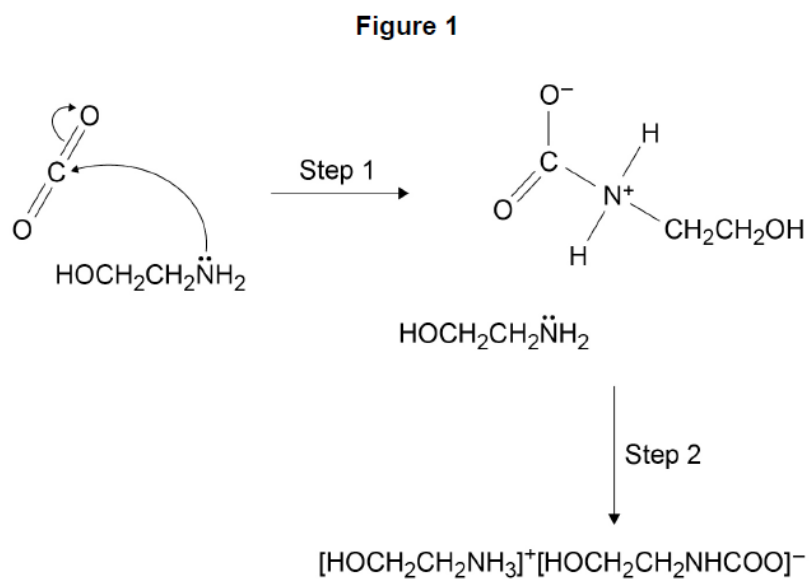
Figure 4



Question	Answers	Additional Comments/Guidelines	Mark
04.3	<p>M1 Electrophilic substitution</p>		1
	<p>M2 for a lone pair and two curly arrows</p>		1
			
	<p>M3 for a curly arrow from the bond to the O</p>		1
			
<p>M4 for a curly arrow from inside the hexagon to the N or + on the N</p>		1	
			
<p>M5 curly arrow from the bond back into the hexagon</p>		1	
			

0 2 . 4 Compound **Z** ( $\text{HOCH}_2\text{CH}_2\text{NH}_2$ ) can be used to remove carbon dioxide from the mixture of waste gases produced in some power stations.

**Figure 1** shows part of a suggested mechanism for the reaction of **Z** with carbon dioxide.

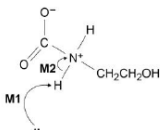


Draw **two** curly arrows to complete the mechanism in **Figure 1**.

Name compound **Z** ( $\text{HOCH}_2\text{CH}_2\text{NH}_2$ )

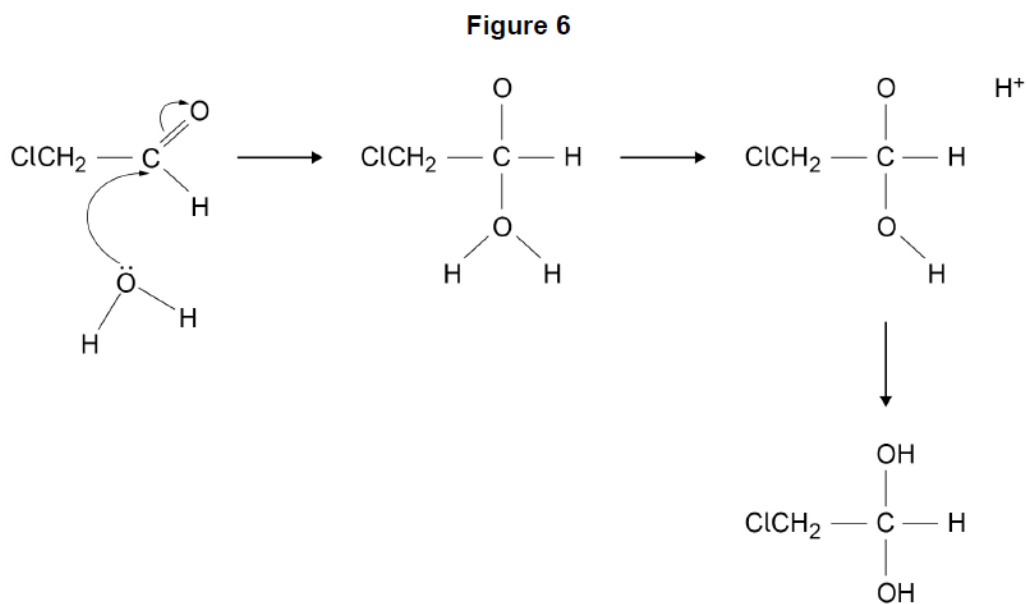
Deduce the role of **Z** in step 2 of the mechanism.

[4 marks]

Question	Answers	Additional Comments/Guidelines	Mark
02.4	 <p data-bbox="316 481 406 504">HOCH<sub>2</sub>CH<sub>2</sub>NH<sub>2</sub></p> <p data-bbox="316 515 438 537">2-aminoethanol</p> <p data-bbox="316 571 359 593">Base</p>	<p data-bbox="906 353 1117 376">Curly arrow from N lp to H</p> <p data-bbox="906 414 1165 436">Curly arrow from N-H bond to N<sup>+</sup></p> <p data-bbox="906 504 1125 571">Allow 2-hydroxyethylamine 2-hydroxyethanamine ethanolamine</p> <p data-bbox="906 582 1308 627">Allow proton acceptor / removes H<sup>+</sup> / electron pair donor</p>	<p data-bbox="1369 353 1399 376">M1</p> <p data-bbox="1369 414 1399 436">M2</p> <p data-bbox="1369 504 1399 526">M3</p> <p data-bbox="1369 582 1399 604">M4</p>

0 9 . 5

**Figure 6** shows an incomplete nucleophilic addition mechanism for the reaction of water with chloroethanal.



Complete the mechanism in **Figure 6** by adding **two** curly arrows, all relevant charges and any lone pairs of electrons involved.

**[3 marks]**

