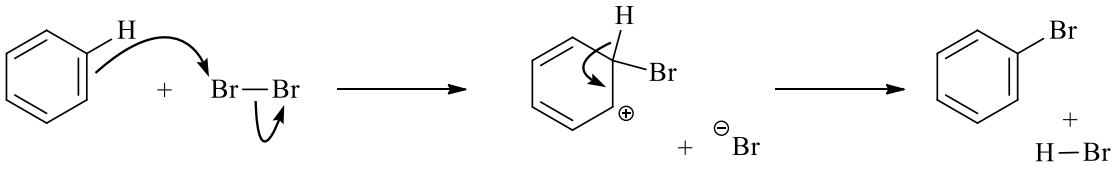
Marks 9

- Benzene can undergo an S_EAr reaction with bromine, Br_2, as shown below. Demonstrate your understanding of this reaction by adding curly arrows to complete the mechanism.



Explain what each part of the abbreviation S_EAr means.

S = **substitution**

E = **electrophilic**

Ar = **aromatic**

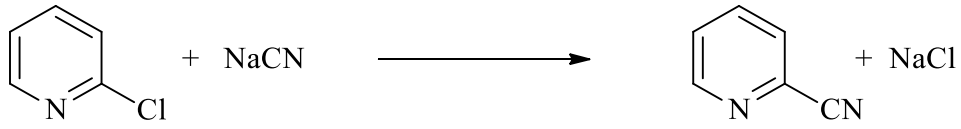
Identify one nucleophile and one electrophile in the scheme above.

nucleophile	electrophile
C=C in step (i). Br^- in step (ii)	**Br_2 in step (i). Carbocation in step (ii).**

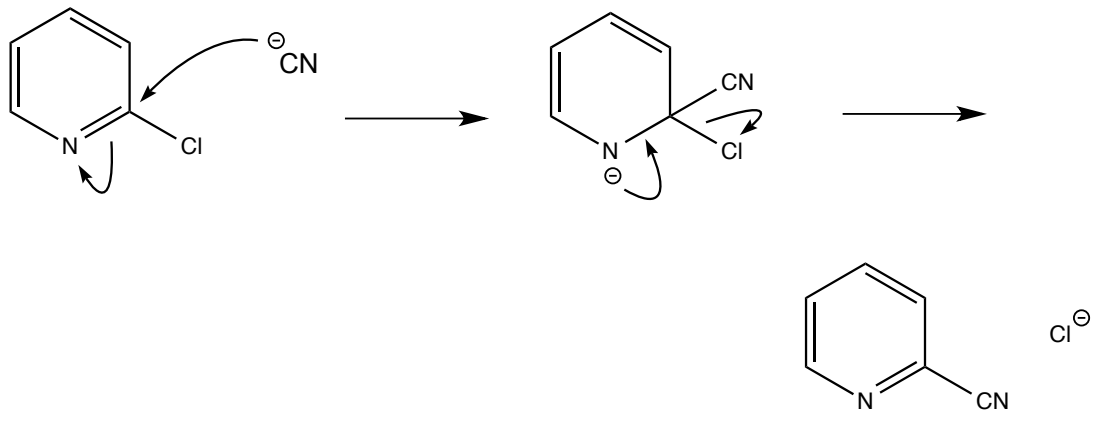
Iron(III) bromide, $FeBr_3$, is often added to the reaction shown above. Why?

It is a catalyst. Br_2 attaches weakly to it causing the non-polar Br-Br bond to become polarised with a partial positive charge on one end. This makes it more electrophilic.

2-Chloropyridine can undergo the following reaction with sodium cyanide.



This reaction also proceeds via a two-step mechanism and an ionic *(i.e.* charged) intermediate. Apply your understanding of organic reactions to propose a mechanism for this reaction.



ANSWER CONTINUES ON THE NEXT PAGE

If the reaction of benzene shown above is S_EAr, how would you classify this reaction of chloropyridine?	**S_NAr (nucleophilic)**