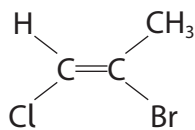


2 Compounds with a carbon–carbon double bond are unsaturated.

(a) What is the name of the compound shown?



(1)

- A *cis*-2-bromo-1-chloroprop-1-ene
- B *E*-2-bromo-1-chloroprop-1-ene
- C *trans*-2-bromo-1-chloroprop-1-ene
- D *Z*-2-bromo-1-chloroprop-1-ene

(b) Ethene reacts with bromine in the dark.

(i) What is the classification of the mechanism for the reaction between ethene and bromine?

(1)

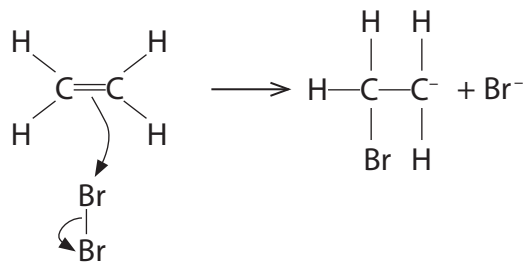
- A electrophilic addition
- B electrophilic substitution
- C nucleophilic addition
- D nucleophilic substitution



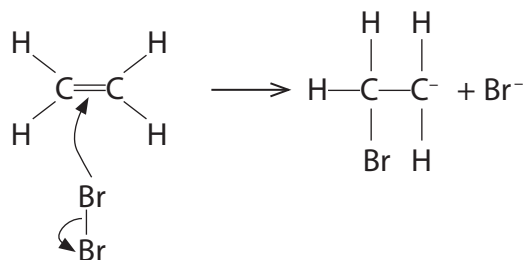
(ii) Which of the following shows the formation of the intermediate in the mechanism for the reaction between ethene and bromine?

(1)

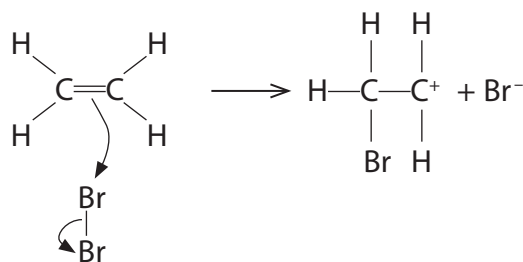
A



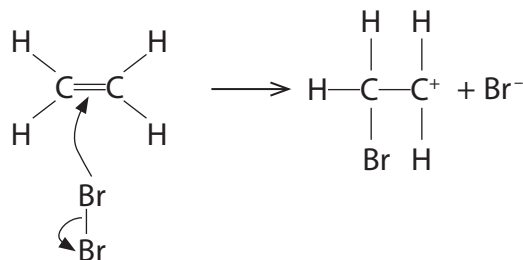
B



C



D



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(c) Ethene reacts with steam to form ethanol in a reversible reaction.



At 300°C and a pressure of 65 atm, the equilibrium yield of ethanol is 5%.

(i) State the effect, if any, on the yield of ethanol when the temperature is **increased**.

(1)

(ii) State the effect, if any, on the yield of ethanol when the pressure is **decreased**.

(1)

(iii) What is the expression for the equilibrium constant,  $K_c$ , for this reaction?

(1)

A  $\frac{[\text{C}_2\text{H}_4(\text{g})] + [\text{H}_2\text{O}(\text{g})]}{[\text{C}_2\text{H}_5\text{OH}(\text{g})]}$

B  $\frac{[\text{C}_2\text{H}_4(\text{g})][\text{H}_2\text{O}(\text{g})]}{[\text{C}_2\text{H}_5\text{OH}(\text{g})]}$

C  $\frac{[\text{C}_2\text{H}_5\text{OH}(\text{g})]}{[\text{C}_2\text{H}_4(\text{g})] + [\text{H}_2\text{O}(\text{g})]}$

D  $\frac{[\text{C}_2\text{H}_5\text{OH}(\text{g})]}{[\text{C}_2\text{H}_4(\text{g})][\text{H}_2\text{O}(\text{g})]}$

(Total for Question 2 = 6 marks)

