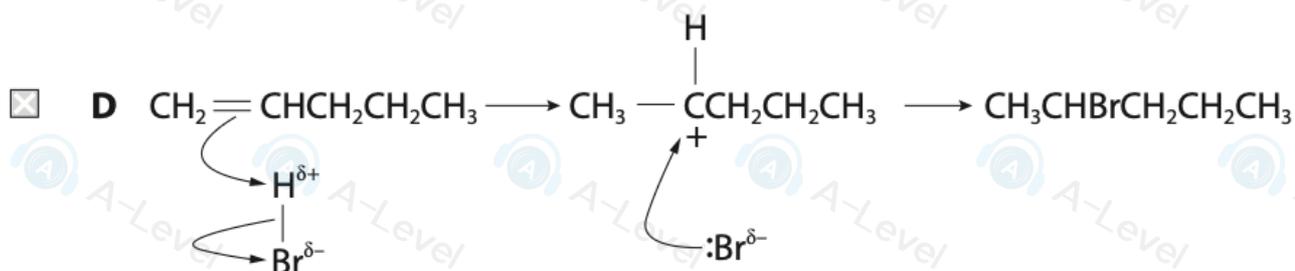
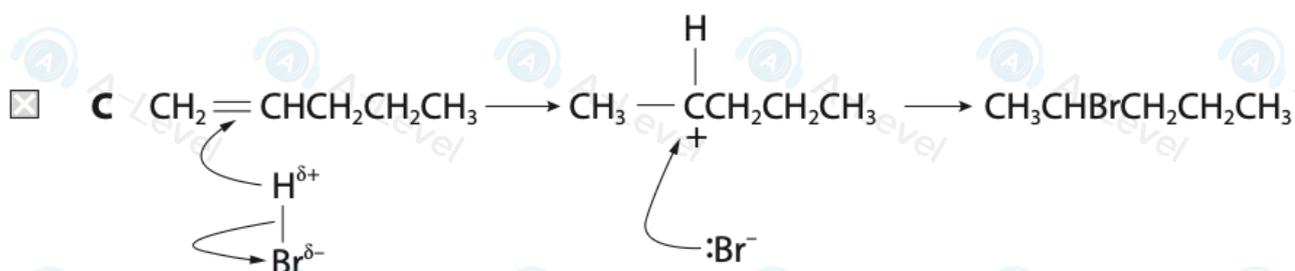
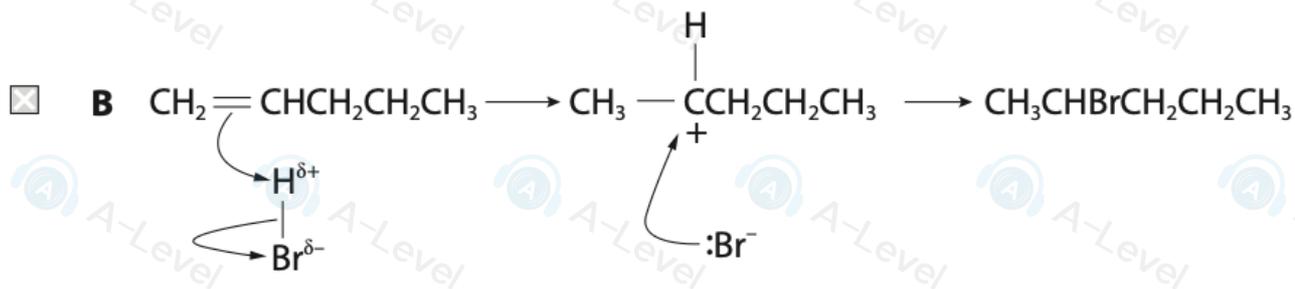
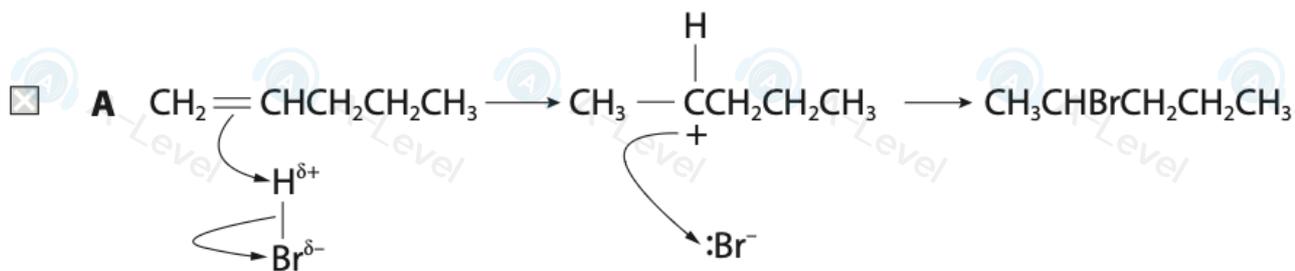


19: Which is the correct mechanism for the electrophilic addition reaction between HBr and pent-1-ene to give the major product?



(Total for Question 19 = 1 mark)



19 Both butter and margarine are fats used in cooking.

(a) Margarines are sold as unsaturated fats.

State the meaning of the term unsaturated.

(1)

(b) (i) The degree of unsaturation can be determined by the reaction with bromine water.

Name the type of reaction.

(1)

Data using 0.5 g of some unsaturated fat in this bromination is given in the table.

Average number of C=C bonds per molecule	Volume of 0.0625 mol dm <sup>-3</sup> bromine water / cm <sup>3</sup>
1	28.3
2	57.3
3	86.9
4	115

(ii) Plot a graph of the data. Include a line of best fit.

(3)

(iii) Data for the bromination of 0.5 g samples of a margarine are shown.

Trial	Volume of $0.0625 \text{ mol dm}^{-3}$ bromine water / $\text{cm}^3$
1	36.9
2	34.1
3	39.3
4	32.5

Calculate the mean volume of bromine water using all results in the table.

(1)

(iv) Determine the average number of  $\text{C}=\text{C}$  bonds per molecule of the unknown sample to 2 significant figures, using your graph.

(1)

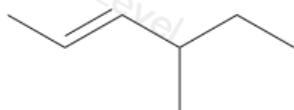
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(c) (i) Using the simplest alkene as an example, draw the mechanism to show the reaction with liquid bromine.

(4)

(ii) Name this compound by applying IUPAC rules.

(1)



(d) Explain the meaning of "trans" in "trans" fats, using a **skeletal** formula showing four carbon atoms in your answer.

(2)