19. Nitrogen compounds

19.1 Primary amines

Paper 1

Question Paper

1 Ethanol can be used to make propanenitrile in two steps.

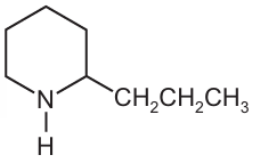
$$CH_3CH_2OH \xrightarrow{X} CH_3CH_2Br \xrightarrow{Y} CH_3CH_2CN$$

What types of reaction are X and Y?

	X	Y
A	free-radical substitution	electrophilic substitution
B	free-radical substitution	nucleophilic substitution
C	nucleophilic substitution	nucleophilic substitution
D	nucleophilic substitution	electrophilic substitution

2 The structure of coniine is shown.

coniine



Coniine can be synthesised by reacting ammonia with a dibromo compound, X.

$$NH_3 + C_8H_{16}Br_2 \xrightarrow{X} \text{coniine} + 2HBr$$

What is compound X?

A 1,1-dibromo-2-propylcyclopentane

B 1,2-dibromo-2-propylcyclopentane

C $Br(CH_2)_3CHBr(CH_2)_3CH_3$

D $Br(CH_2)_4CHBr(CH_2)_2CH_3$

3 Butanoic acid can be made from 1-bromopropane in two stages.

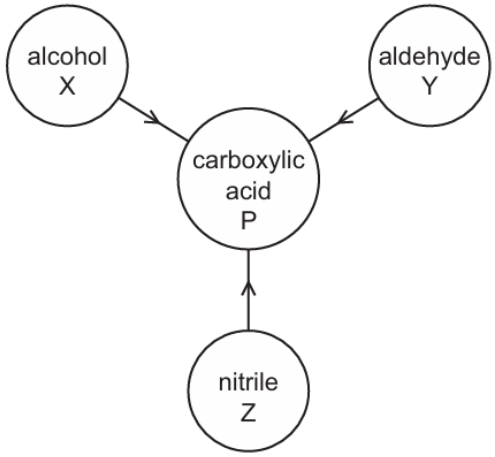
stage 1 $CH_3CH_2CH_2Br \rightarrow CH_3CH_2CH_2CN$

stage 2 $CH_3CH_2CH_2CN \rightarrow CH_3CH_2CH_2CO_2H$

Which types of reaction are stage 1 and stage 2?

	stage 1	stage 2
A	electrophilic addition	hydrolysis
B	electrophilic addition	oxidation
C	nucleophilic substitution	hydrolysis
D	nucleophilic substitution	oxidation

4 The diagram shows that a carboxylic acid P may be formed from X, Y or Z.



Which row is correct?

	alcohol X is	the change in M_r is greatest for
A	primary	Y to P
B	primary	Z to P
C	secondary	Y to P
D	secondary	Z to P

5 If ammonium cyanate is heated in the absence of air, the only product of the reaction is urea, $CO(NH_2)_2$. No other products are formed in the reaction.

What is the formula of the cyanate ion present in ammonium cyanate?

A CON_2^- **B** CON_2^{2-} **C** OCN^- **D** OCN^{2-}