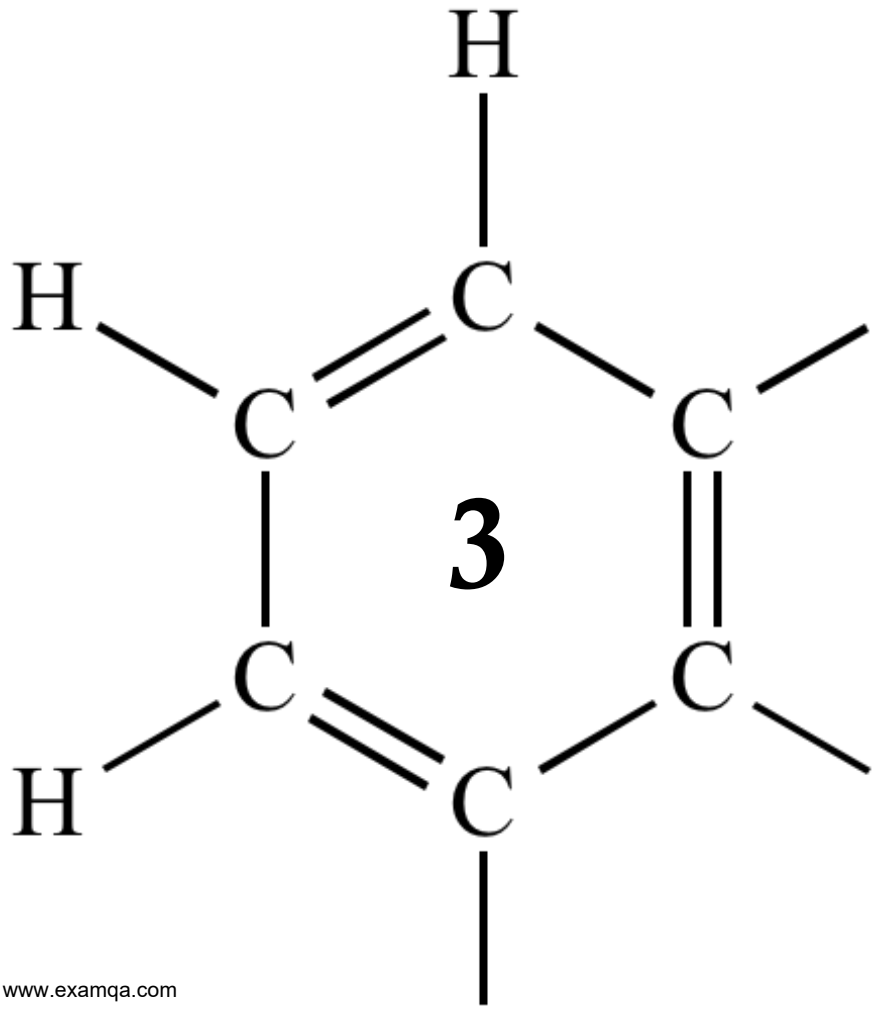
LONDON SCIENCE COLLEGE

AQA A2 CHEMISTRY

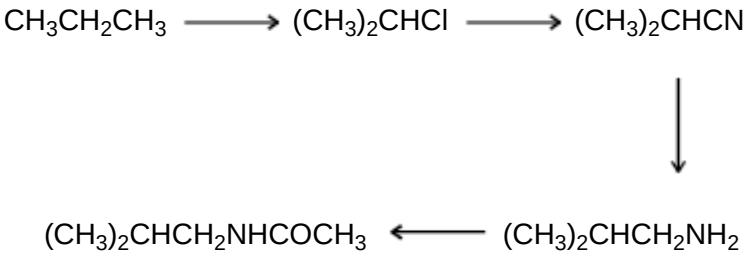
SYNTHESIS ~ ANALYSIS

ORGANIC SYNTHESIS



3

1 Which one of the following types of reaction is **not** involved in the above sequence?



A halogenation

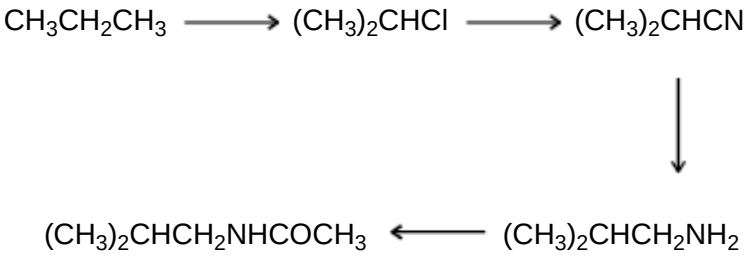
B acylation

C reduction

D oxidation

(Total 1 mark)

2 Which one of the following types of reaction mechanism is **not** involved in the above sequence?



A free-radical substitution

B nucleophilic substitution

C elimination

D nucleophilic addition-elimination

(Total 1 mark)

3

(a) **P**, **Q** and **R** have the molecular formula C_6H_{12}

All three are branched-chain molecules and none is cyclic.
P can represent a pair of optical isomers.
Q can represent a pair of geometrical isomers.
R can represent another pair of geometrical isomers different from **Q**.

Draw one possible structure for one of the isomers of each of **P**, **Q** and **R**.

*Structure of **P***

*Structure of **Q***

*Structure of **R***

(3)

(b) Butanone reacts with reagent **S** to form compound **T** which exists as a racemic mixture. Dehydration of **T** forms **U**, C_5H_7N, which can represent a pair of geometrical isomers.

(i) State the meaning of the term *racemic mixture* and suggest why such a mixture is formed in this reaction.

Racemic mixture .....

.....

Explanation.....

.....

.....

(ii) Identify reagent **S**, and draw a structural formula for each of **T** and **U**.

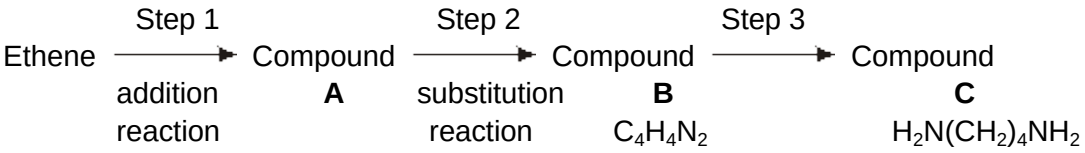
*Reagent **S*** .....

*Compound **T***

*Compound **U***

(6)
(Total 9 marks)

4 (a) Compound **C**, $H_2N(CH_2)_4NH_2$, can be synthesised from ethene in three steps as shown below.



Name compound **C** and draw a structure for each of compounds **A** and **B**.
State the reagent(s) required for each step and name the type of reaction involved in the conversion of **B** into **C**.

(7)

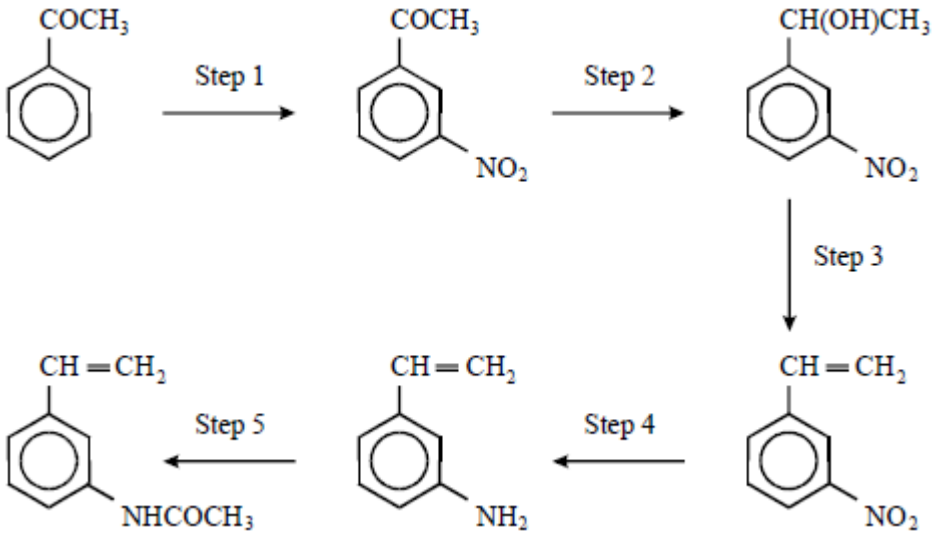
(b) Draw the repeating unit of the polyamide formed when **C** reacts with hexanedioic acid.
Discuss the interactions between the chains of the polyamide.

(4)

(c) Explain why polyamides are degraded by sodium hydroxide whereas polymers such as poly(ethene) are not.

(3)
(Total 14 marks)

5 Refer to the following reaction sequence:



Which one of the following types of reaction is **not** involved in the above sequence?

A acylation

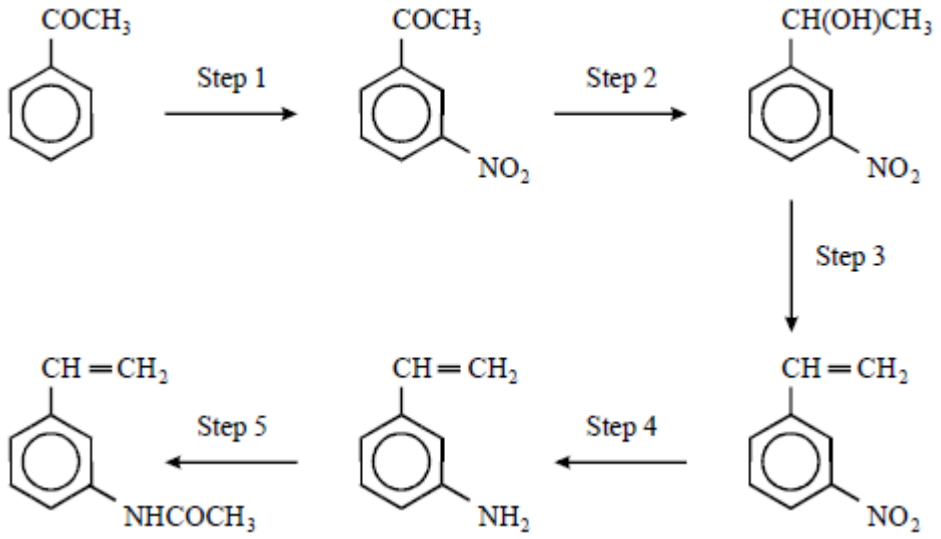
B oxidation

C reduction

D dehydration

(Total 1 mark)

6 Refer to the following reaction sequence:



Which one of the following types of reaction mechanism is **not** involved in the above sequence?

A electrophilic addition

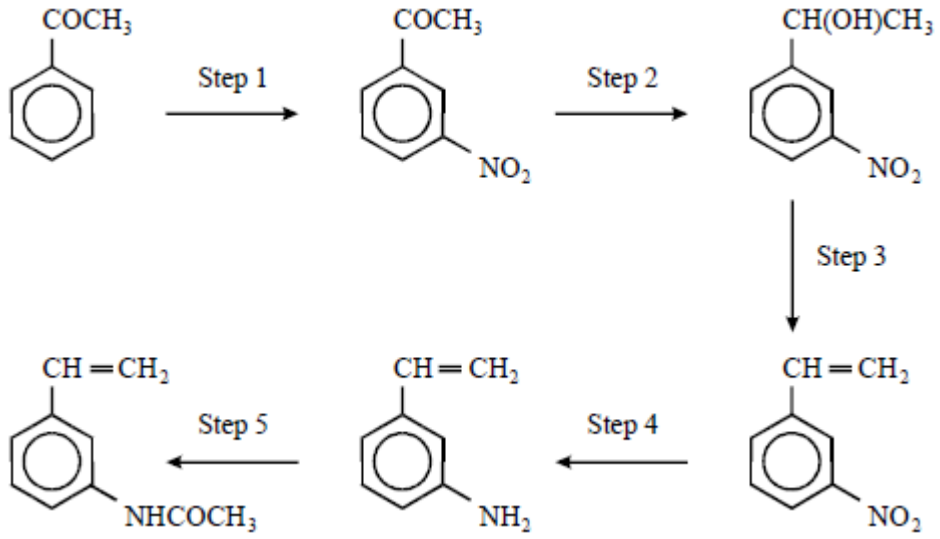
B electrophilic substitution

C addition−elimination

D elimination

(Total 1 mark)

7 Refer to the following reaction sequence:



Which one of the following would be the most appropriate to carry out Step 2?

A H_2 / Ni

B Sn / HCl

C $NaBH_4$

D Fe / HCl

(Total 1 mark)