9 **(a)** Explain why amides are much weaker bases than amines.

.....

.....

.....

..... [2]

(b) Fig. 9.1 shows the preparation of 2-phenylethylamine, $C_6H_5CH_2CH_2NH_2$, by three different routes.

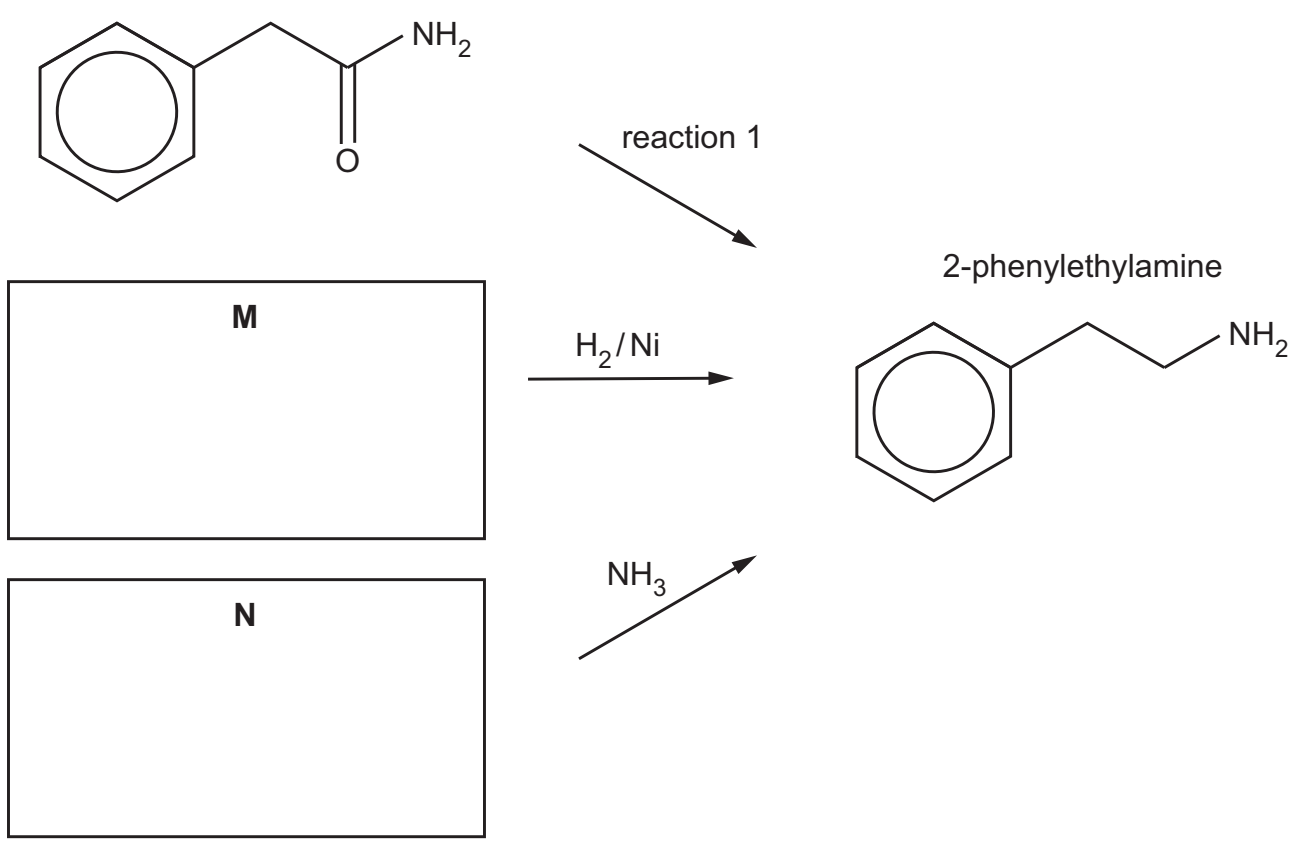


Fig. 9.1

(i) Suggest structures for compounds **M** and **N** and draw them in the boxes in Fig. 9.1. [2]

(ii) Give the reagents and conditions for reaction 1.

..... [1]

(c) Fig. 9.2 shows compound **H** which is a useful starting material in organic synthesis.

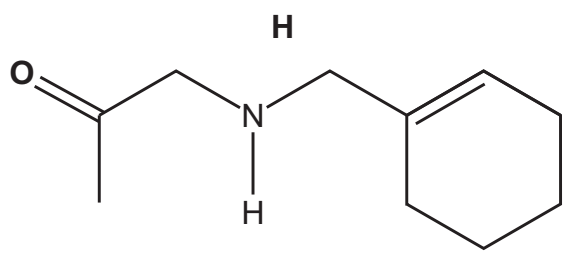


Fig. 9.2

H contains an alkene and an amine functional group.

Name the **other** functional group and give the classification of the amine group in **H**.

other functional group in **H** .....

classification of amine .....

[1]

(d) Ozonolysis involves the oxidative cleavage of a C=C bond in alkenes using ozone, O_3, as shown in Fig. 9.3.

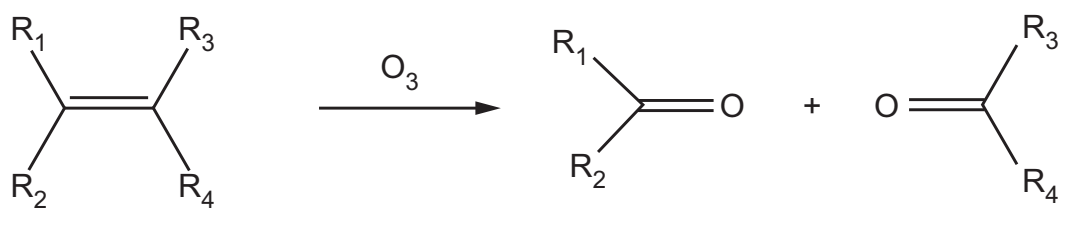


Fig. 9.3

Fig. 9.4 shows the first step in this reaction which involves the formation of an ozonide intermediate.

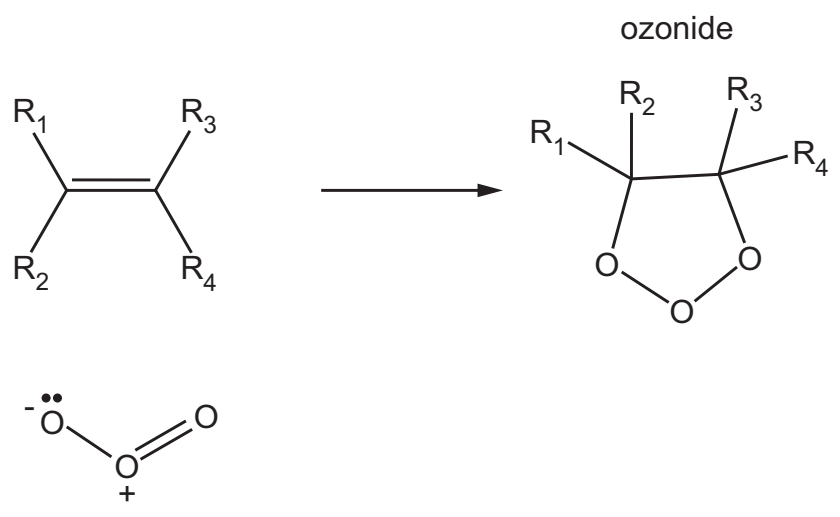
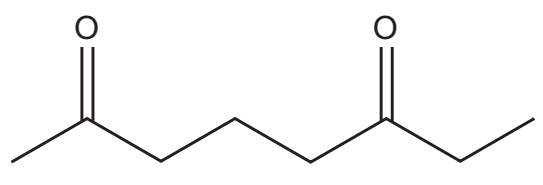


Fig. 9.4

(i) On Fig. 9.4, draw **three** curly arrows to complete the mechanism of this step. [2]

(ii) **L** is formed from alkene **K**, C_8H_{14}, by a similar reaction to that shown in Fig. 9.3.

L



Suggest the structure of **K**.

K C_8H_{14}

[1]

[Total: 9]

Important values, constants and standards

molar gas constant	$R = 8.31\,J\,K^{-1}\,mol^{-1}$
Faraday constant	$F = 9.65 \times 10^4\,C\,mol^{-1}$
Avogadro constant	$L = 6.02 \times 10^{23}\,mol^{-1}$
electronic charge	$e = -1.60 \times 10^{-19}\,C$
molar volume of gas	$V_m = 22.4\,dm^3\,mol^{-1}$ at s.t.p. (101 kPa and 273 K) $V_m = 24.0\,dm^3\,mol^{-1}$ at room conditions
ionic product of water	$K_w = 1.00 \times 10^{-14}\,mol^2\,dm^{-6}$ (at 298 K (25 °C))
specific heat capacity of water	$c = 4.18\,kJ\,kg^{-1}\,K^{-1}$ ($4.18\,J\,g^{-1}\,K^{-1}$)