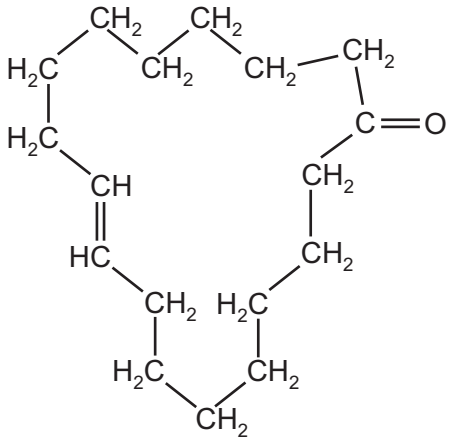
26 The naturally-occurring molecule civetone is found in a gland of the African civet cat and has been used in perfumery.



civetone

With which reagent will civetone **not** react?

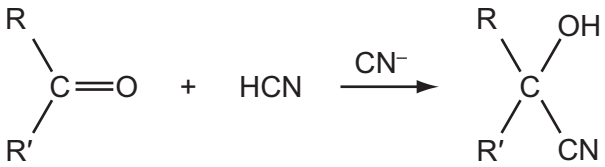
A 2,4-dinitrophenylhydrazine reagent

B Fehling's reagent

C hydrogen bromide

D sodium tetrahydridoborate(III) (sodium borohydride)

27 Cyanohydrins can be made from carbonyl compounds by generating CN^- ions from HCN in the presence of a weak base.



In a similar reaction, $^-CH_2CO_2CH_3$ ions are generated from $CH_3CO_2CH_3$ by strong bases.

Which compound can be made from an aldehyde and $CH_3CO_2CH_3$ in the presence of a strong base?

A $CH_3CH(OH)CO_2CH_3$

B $CH_3CO_2CH_2CH(OH)CH_3$

C $CH_3CH_2CH(OH)CH_2CO_2CH_3$

D $(CH_3)_2C(OH)CH_2CO_2CH_3$

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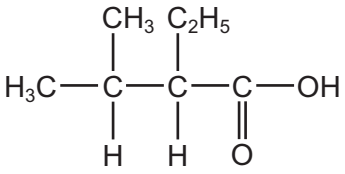
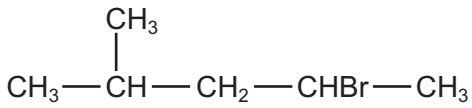
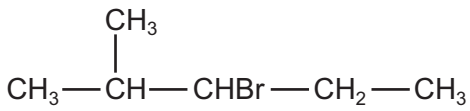
28 The characteristic odour of rum is attributed to the compound 2-ethyl-3-methylbutanoic acid.

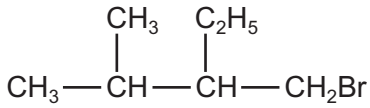


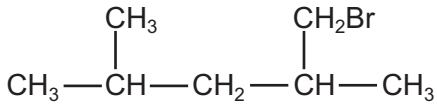
2-ethyl-3-methylbutanoic acid

Which compound will produce 2-ethyl-3-methylbutanoic acid by heating under reflux with alcoholic sodium cyanide and subsequent acid hydrolysis of the reaction product?

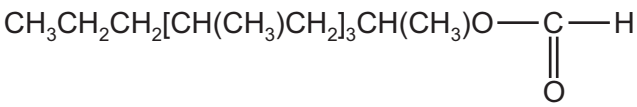
A 

B 

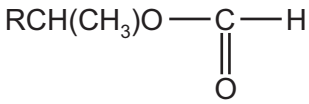
C 

D 

29 The acarid mite releases *lardolure* to attract other mites to a host. This chemical can be destroyed by hydrolysis with acid.



A simplified formula for *lardolure* may be written as follows.



What are the products of its hydrolysis?

A $RCH(CH_3)CO_2H + CH_3OH$

B $RCH(CH_3)CO_2H + HCO_2H$

C $RCH(CH_3)OH + CO_2$

D $RCH(CH_3)OH + HCO_2H$

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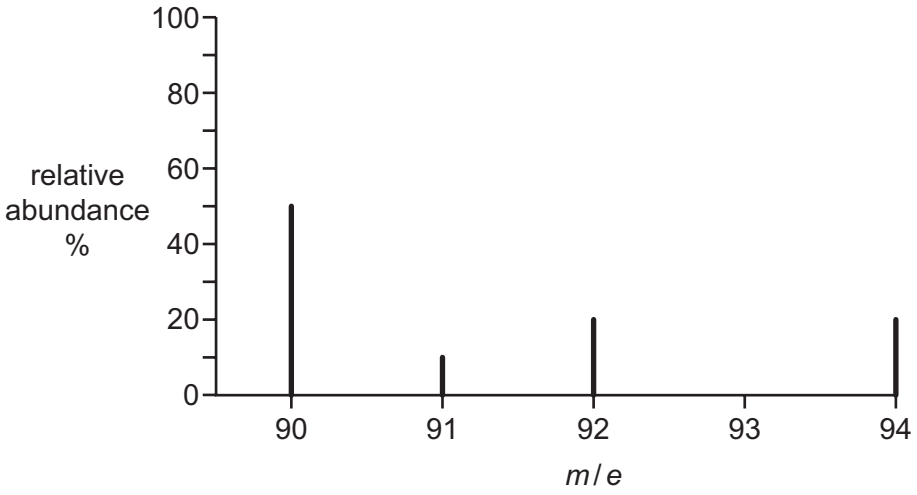
30 An element **X** consists of four isotopes. The mass spectrum of **X** is shown in the diagram.



What is the relative atomic mass of **X**?

A 91.00 **B** 91.30 **C** 91.75 **D** 92.00

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Section B

For each of the questions in this section, one or more of the three numbered statements **1** to **3** may be correct.

Decide whether each of the statements is or is not correct (you may find it helpful to put a tick against the statements that you consider to be correct).

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and **3** are correct	**1** and **2** only are correct	**2** and **3** only are correct	**1** only is correct

No other combination of statements is used as a correct response.

31 Which physical properties are due to hydrogen bonding between water molecules?

1 Water has a higher boiling point than H_2S.

2 Ice floats on water.

3 The H–O–H bond angle in water is approximately 104°.

32 Which equilibria, in which all species are gaseous, would have equilibrium constants, K_p, with no units?

1 sulfur dioxide and oxygen in equilibrium with sulfur trioxide

2 hydrogen and iodine in equilibrium with hydrogen iodide

3 carbon monoxide and steam in equilibrium with carbon dioxide and hydrogen

33 Why does a mixture of hydrogen gas and bromine gas react together faster at a temperature of 500 K than it does at a temperature of 400 K?

1 A higher proportion of effective collisions occurs at 500 K.

2 Hydrogen molecules and bromine molecules collide more frequently at 500 K.

3 The activation energy of the reaction is lower at 500 K.

34 A farmer added lime to damp soil, followed by the nitrogenous fertiliser ammonium sulfate. A chemical reaction occurred in the soil.

Which substances were formed in this reaction?

1 sulfuric acid

2 calcium sulfate

3 ammonia

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