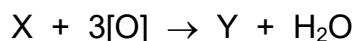
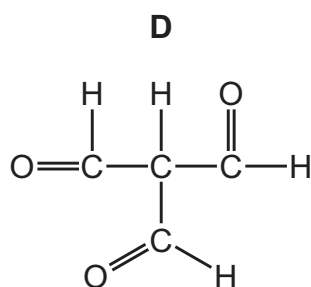
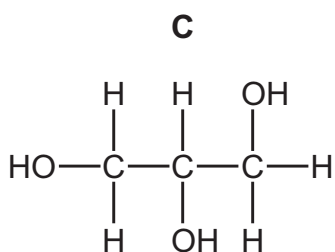
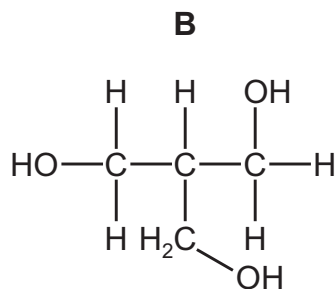
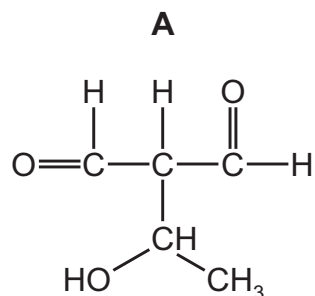


33 The balanced equation for the reaction of X with an excess of acidified $\text{K}_2\text{Cr}_2\text{O}_7$ is shown.



Compound Y is the only organic product of the reaction.

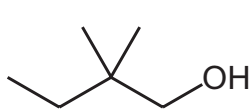
Which compound is X?



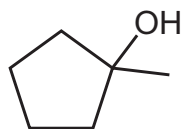
39 Some properties of compound X are listed.

- 1.0 mol X reacts with exactly 8.5 mol oxygen when completely combusted.
- X does **not** react when heated with acidified KMnO_4 .

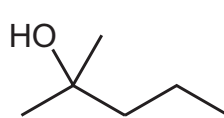
What are the possible identities of X?



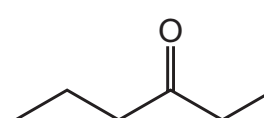
1



2



3



4

A 1 and 3

B 2 and 4

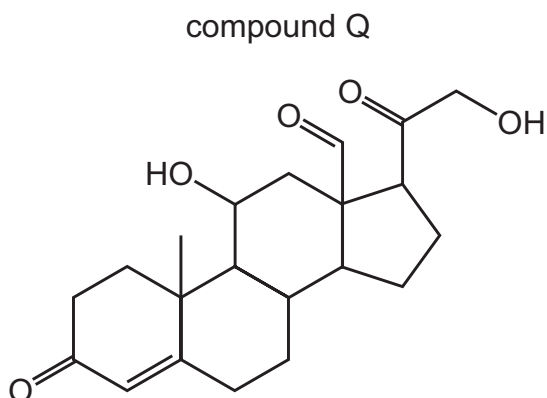
C 3 only

D 4 only

32 Which reaction mixture produces a primary alcohol as the major product?

- A** propanone with NaBH_4
- B** propene with steam in the presence of H_3PO_4
- C** butanoic acid with LiAlH_4
- D** ethene with hot concentrated acidified KMnO_4

35 The structure of a naturally occurring compound, Q, is shown.



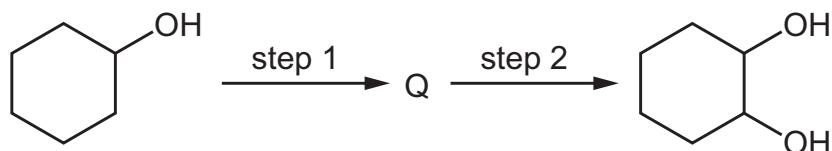
Compound Q is heated under reflux with an excess of acidified KMnO_4 .

Organic product R is formed.

Which row is correct?

	results of tests with compound Q	results of tests with organic product R
A	orange precipitate with 2,4-DNPH and no reaction with alkaline $\text{I}_2(\text{aq})$	yellow precipitate with alkaline $\text{I}_2(\text{aq})$ and no reaction with Fehling's reagent
B	red precipitate with Fehling's reagent and no reaction with alkaline $\text{I}_2(\text{aq})$	orange precipitate with 2,4-DNPH and no reaction with alkaline $\text{I}_2(\text{aq})$
C	yellow precipitate with alkaline $\text{I}_2(\text{aq})$ and orange precipitate with 2,4-DNPH	no reaction with alkaline $\text{I}_2(\text{aq})$ and no reaction with Fehling's reagent
D	yellow precipitate with alkaline $\text{I}_2(\text{aq})$ and red precipitate with Fehling's reagent	yellow precipitate with alkaline $\text{I}_2(\text{aq})$ and orange precipitate with 2,4-DNPH

33 Cyclohexanol is converted to cyclohexane-1,2-diol via a two-step synthesis that proceeds via intermediate Q.



Which row identifies the type of reaction in step 1 and in step 2?

	step 1	step 2
A	dehydration	oxidation
B	dehydration	nucleophilic substitution
C	reduction	oxidation
D	reduction	nucleophilic substitution

- 3 Propan-2-ol, $(\text{CH}_3)_2\text{CHOH}$, is sometimes added to fuel to help it burn.

Fig. 3.1 shows some reactions of propan-2-ol.

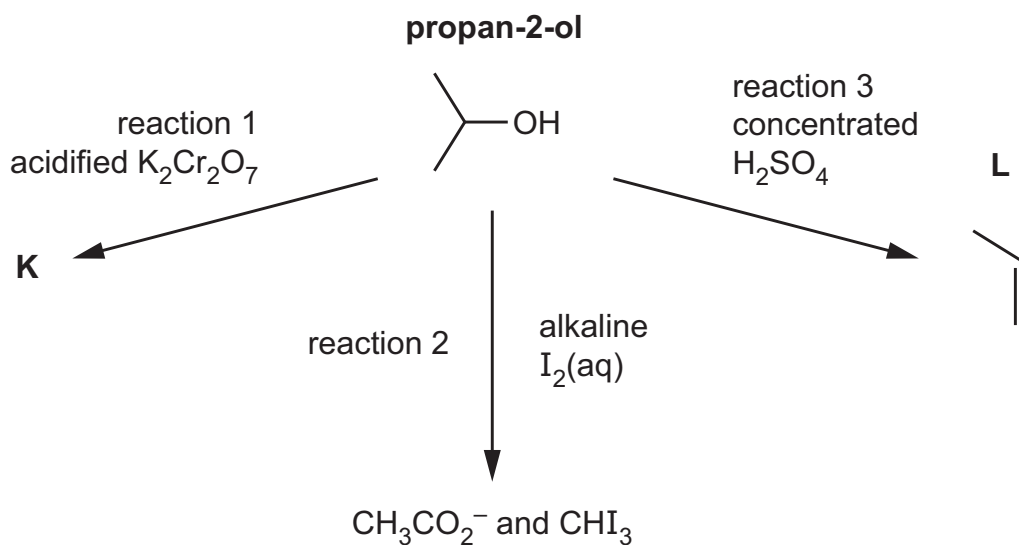


Fig. 3.1

- (a) (i) Draw the structure of organic compound **K**.

[1]

- (ii) State an observation you would make in reaction 2.

..... [1]

- (iii) State the type of reaction that is shown in reaction 3.

..... [1]

- (iv) Complete Fig. 3.2 to show the pi (π) bond in **L** that is formed from orbital overlap.

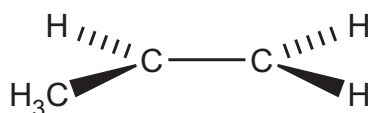


Fig. 3.2

[1]

- (b) Propan-2-ol reacts with sodium to produce $(\text{CH}_3)_2\text{CH-O}^-$ anions.

These anions react with 2-bromopropane to form compound **N**, as shown in Fig. 3.3.

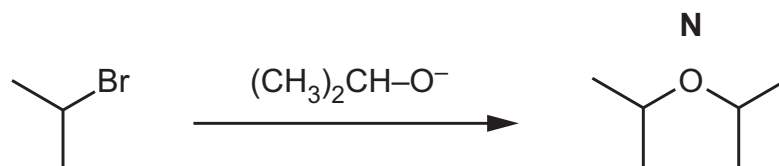


Fig. 3.3

- (i) Write an equation for the reaction of propan-2-ol with sodium.

..... [1]

- (ii) The reaction of 2-bromopropane with $(\text{CH}_3)_2\text{CH-O}^-$ anions follows an $\text{S}_{\text{N}}1$ mechanism.

Complete Fig. 3.4 to show this mechanism. Include charges, dipoles, lone pairs of electrons and curly arrows, as appropriate.



Fig. 3.4

[3]

- (iii) Suggest how the rate of the $\text{S}_{\text{N}}1$ reaction would change, if at all, if 2-chloropropane were used instead of 2-bromopropane.

Explain your answer.

.....
.....
..... [2]

- (iv) **N** is also added to petrol to make it burn more smoothly.

Construct an equation for the complete combustion of **N**, $\text{C}_6\text{H}_{14}\text{O}$.

$\text{C}_6\text{H}_{14}\text{O}$ [1]

[Total: 11]