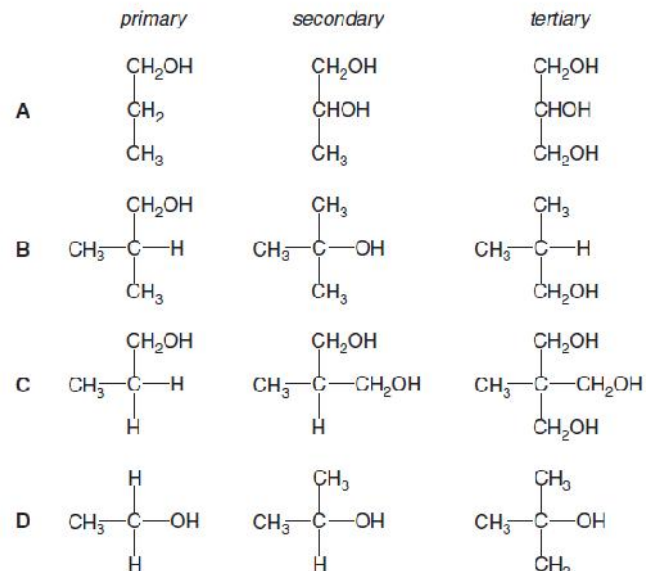

CHEMISTRY MULTIPLE CHOICE QUESTIONS

Organic Chemistry
Hydroxyl Compounds

2002 -2009

1.

Which set of alcohols correctly shows a primary, a secondary and a tertiary alcohol?



[2002 M/J (20)]

2.

An organic compound will decolorise dilute acidified aqueous potassium manganate(VII) on warming, but will not decolorise bromine water.

What could the organic compound be?

- A butane
- B ethanol
- C ethene
- D ethanoic acid

[2002 M/J (26)]

3.

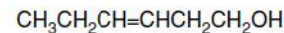
Which alcohols on oxidation with acidified potassium dichromate(VI) give an organic product which causes an effervescence when reacted with sodium carbonate?

- 1 butan-1-ol
- 2 2-methylpropan-1-ol
- 3 2-methylpropan-2-ol

[2002 M/J (40)]

4.

The compound hex-3-en-1-ol, **P**, has a strong 'leafy' smell of newly cut grass and is used in perfumery.



P

What is produced when **P** is treated with an excess of hot concentrated acidic KMnO_4 ?

- A $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{OH})\text{CH}_2\text{CH}_2\text{OH}$
- B $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CO}_2\text{H}$
- C $\text{CH}_3\text{CH}_2\text{CHO}$ and $\text{OCHCH}_2\text{CH}_2\text{OH}$
- D $\text{CH}_3\text{CH}_2\text{CO}_2\text{H}$ and $\text{HO}_2\text{CCH}_2\text{CO}_2\text{H}$

[2003 M/J (22)]

5.

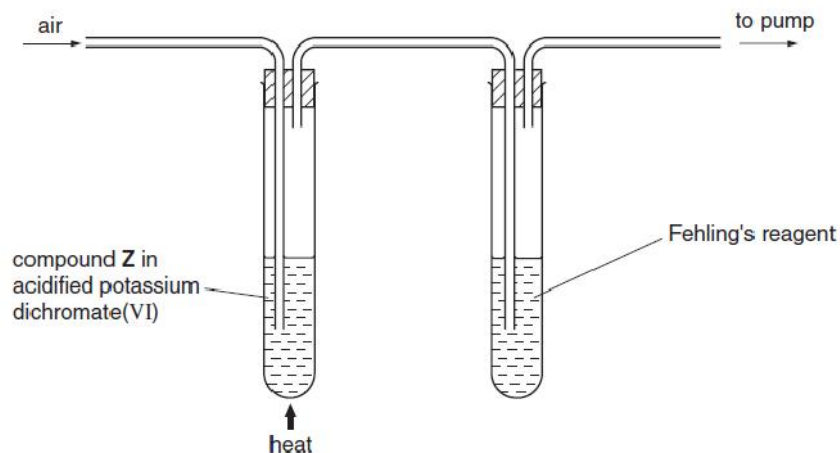
In its reaction with sodium, 1 mol of a compound **X** gives 1 mol of $\text{H}_2(\text{g})$.

Which compound might **X** be?

- A $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- B $(\text{CH}_3)_3\text{COH}$
- C $\text{CH}_3\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$
- D $\text{CH}_3\text{CH}(\text{OH})\text{CO}_2\text{H}$

[2003 M/J (28)]

6. When the apparatus below was used with compound Z, a brick-red precipitate formed in the right-hand tube.

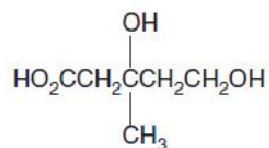


Which compound could be Z?

- 1 $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ 2 $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ 3 CH_3OH

[2003 M/J (39)]

7. Mevalonic acid is an intermediate in the biosynthesis of cholesterol, and is shown below.



Which properties does mevalonic acid have?

- 1 It has only one chiral carbon atom.
- 2 It can be esterified both by ethanoic acid and by ethanol, in the presence of H^+ ions.
- 3 It contains both primary and secondary alcohol groups.

[2003 M/J (40)]

8. Which alcohol gives only one oxidation product when warmed with dilute acidified potassium dichromate(VI)?

- A butan-1-ol
- B butan-2-ol
- C 2-methylpropan-1-ol
- D 2-methylpropan-2-ol

[2003 O/N (26)]

9. What will react differently with the two isomeric pentanols, $(\text{CH}_3)_3\text{CCH}_2\text{OH}$ and $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}$?

- A acidified aqueous potassium manganate(VII)
- B concentrated sulphuric acid
- C phosphorus pentachloride
- D sodium

[2003 O/N (27)]

10. How many hydrogen atoms in a molecule of glycerol, $\text{HOCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OH}$, may be substituted by deuterium on dissolving it in an excess of D_2O ?

- A 2 B 3 C 5 D 8

[2003 O/N (28)]

11. What can be produced when an aqueous solution of butan-1-ol is heated with dilute acidified potassium manganate(VII)?

- 1 butanal
- 2 butanoic acid
- 3 butanone

[2004 M/J (38)]

12.

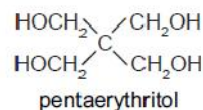
Which isomer of $C_5H_{11}OH$ gives, on dehydration, the greatest number of different alkenes?

- A $CH_3-CH_2-\underset{\substack{| \\ CH_3}}{CH}-CH_2OH$
- B $CH_3-CH_2-CH_2-\underset{\substack{| \\ OH}}{CH}-CH_3$
- C $CH_3-CH_2-\underset{\substack{| \\ OH}}{CH}-CH_2-CH_3$
- D $CH_3-\underset{\substack{| \\ CH_3}}{CH}-CH_2-CH_2OH$

[2004 O/N (28)]

13.

Pentaerythritol is an intermediate in the manufacture of paint.



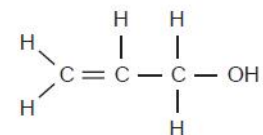
Which of the following statements about pentaerythritol are correct?

- 1 It reacts with metallic sodium.
- 2 It is dehydrated by concentrated sulphuric acid to an alkene.
- 3 Its empirical formula is CH_3O .

[2004 O/N (39)]

14.

Prop-2-en-1-ol (allyl alcohol) has the following structure.



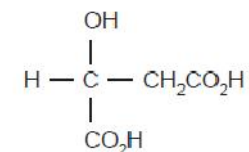
Which reagent would react with prop-2-en-1-ol to form a product that could exist as optical isomers?

- A bromine
- B hydrogen and nickel
- C phosphorus pentachloride
- D sodium

[2005 M/J (20)]

15.

Malic acid occurs in apples.



malic acid

Which substance will react with all three $-OH$ groups present in the malic acid molecule?

- A ethanol in the presence of concentrated sulphuric acid
- B potassium hydroxide
- C sodium
- D sodium carbonate

[2005 M/J (26)]

16.

Which reagent could detect the presence of alcohol in a petrol consisting mainly of a mixture of alkanes and alkenes?

- A Na
- B Br₂ (in CCl₄)
- C KMnO₄(aq)
- D 2,4-dinitrophenylhydrazine

[2006 M/J (26)]

17.

Which compounds are able to react with concentrated sulphuric acid to give a product that will decolourise acidic potassium manganate(VII)?

- 1 (CH₃)₃COH
- 2 CH₃CH₂CH(OH)CH₃
- 3 CH₃CO₂H

[2006 O/N (39)]

18.

An alcohol with molecular formula C_nH_{2n+1}OH has a chiral carbon atom but does not react with MnO₄⁻ / H⁺.

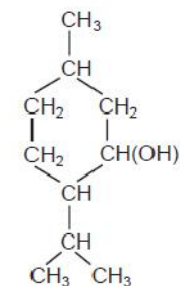
What is the least number of carbon atoms such an alcohol could possess?

- A 5
- B 6
- C 7
- D 8

[2007 M/J (26)]

19.

Menthol, from oil of mint, is used in soaps and perfumes.



menthol

Which statements about menthol are correct?

- 1 There is a total of two chiral centres present in the menthol molecule.
- 2 On reaction with concentrated sulphuric acid, menthol produces a mixture of two alkenes.
- 3 A solution of acidified potassium dichromate(VI), on warming with menthol, changes colour from orange to green.

[2007 M/J (39)]

20.

Which reaction will distinguish between a primary and a secondary alcohol?

- A warming with H⁺ / MnO₄⁻
- B warming with H⁺ / Cr₂O₇²⁻
- C dehydration, followed by reaction with Br₂(aq)
- D oxidation, followed by reaction with Fehling's (or Tollens') reagent

[2007 O/N (27)]

21.

Which structures show a primary alcohol that **cannot** be dehydrated to form an alkene?

- 1 CH₃OH
- 2 CH₃CH₂OH
- 3 CH₃CH(OH)CH₃

[2007 O/N (38)]

22.

An alcohol of molecular formula $C_4H_{10}O_2$ contains two OH groups and has an unbranched carbon atom chain.

On reaction with an excess of hot MnO_4^-/H^+ this alcohol is converted into a compound of molecular formula $C_4H_6O_4$.

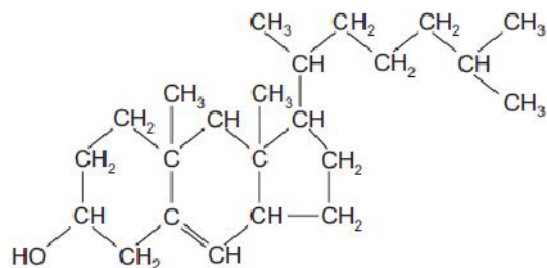
To which two carbon atoms in the chain of the alcohol are the two OH groups attached?

- A 1st and 2nd
- B 1st and 3rd
- C 1st and 4th
- D 2nd and 3rd

[2008 M/J (26)]

23.

The compound cholesterol has the following structure.



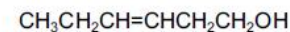
Which statements are correct?

- 1 Cholesterol reacts with a mixture of ethanoic acid and concentrated sulphuric acid.
- 2 Cholesterol reacts with bromine to form a compound which has two new chiral centres.
- 3 Cholesterol is oxidised by acidified sodium dichromate(VI) to form an aldehyde.

[2008 M/J (39)]

24.

The compound 'leaf alcohol' is partly responsible for the smell of new-mown grass.



leaf alcohol

Which two compounds will be formed when 'leaf alcohol' is oxidised using hot, concentrated manganate(VII) ions?

- A CH_3CO_2H and $HOCH_2CH_2CH_2CO_2H$
- B CH_3CO_2H and $HO_2CCH_2CH_2CO_2H$
- C $CH_3CH_2CO_2H$ and $HO_2CCH_2CO_2H$
- D $CH_3CH_2CO_2H$ and $HOCH_2CH_2CO_2H$

[2008 O/N (21)]

25.

The functional group in a primary alcohol is $-CH_2OH$.

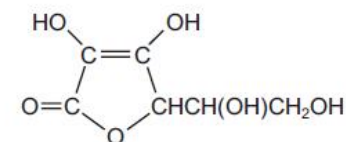
Which reagent reacts with a primary alcohol, under suitable conditions, to give an organic product with the same number of oxygen atoms as the alcohol?

- A Al_2O_3
- B CH_3CO_2H
- C HBr
- D Na

[2008 O/N (25)]

26.

The structure of the antioxidant vitamin C is shown in the diagram.



On the basis of this structure, which properties is vitamin C likely to have?

- 1 It is soluble in water.
- 2 It decolourises aqueous bromine rapidly.
- 3 It reduces Fehling's reagent.

[2008 O/N (40)]

27.

Glycol, used in anti-freeze, has the formula $\text{HOCH}_2\text{CH}_2\text{OH}$. It can be oxidised to give a number of products.

What is the molecular formula of an oxidation product of glycol that will **not** react with sodium?

- A** $\text{C}_2\text{H}_2\text{O}_2$ **B** $\text{C}_2\text{H}_2\text{O}_3$ **C** $\text{C}_2\text{H}_2\text{O}_4$ **D** $\text{C}_2\text{H}_4\text{O}_2$

[2009 M/J (26)]

28.

A compound **Y** has the following properties.

- It is a liquid at room temperature and atmospheric pressure.
- It does not mix completely with water.
- It does not decolourise acidified potassium manganate(VII).

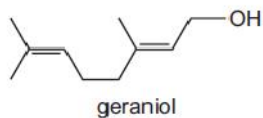
What could **Y** be?

- A** ethane
B ethanoic acid
C ethanol
D ethyl ethanoate

[2009 M/J (30)]

29.

Geraniol is one of several compounds produced by the scent glands of honey bees to help them mark nectar-bearing flowers and locate the entrances to their hives.



Which reactions will geraniol undergo?

- 1 reaction with hot concentrated acidic KMnO_4 to give propanone
- 2 addition of halogens
- 3 reaction with aqueous NaHCO_3 to give CO_2

[2009 M/J (38)]