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CHEMISTRY

ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	ALKENES
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	10
TOTAL MARKS	35

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Alkenes - 2

1. 2-Methyl but-2-ene reacts with concentrated sulfuric acid to form two different products.

(a) Outline a mechanism for this reaction to show the formation of the major product.

(4)

(b) Draw the structure of the minor product of this reaction.

(1)

(c) Explain why the two products are formed in different amounts.

(2)

2. Which compound reacts with hydrogen bromide to give 2-bromo-3-methylbutane as the major product?

A. $(CH_3)_2C=CHCH_3$
B. $(CH_3)_2C=CH_2$
C. $CH_2=C(CH_3)CH_2CH_3$
D. $(CH_3)_2CHCH=CH_2$

(1)

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3. The following pairs of compounds can be distinguished by simple test−tube reactions.

For each pair of compounds, give a reagent (or combination of reagents) that, when added separately to each compound, could be used to distinguish between them.

State what is observed in each case.

(a) Aqueous silver nitrate and aqueous sodium nitrate

(3)

(b) Aqueous magnesium chloride and aqueous barium chloride

(3)

4. Which one of the following reactions will produce an organic compound that has optical isomers?

A. dehydration of butan-2-ol by heating with concentrated sulphuric acid
B. reduction of pentan-3-one by warming with $NaBH_4$
C. addition of Br_2 to 3-bromopropene
D. reduction of 2,3-dimethylpent-2-ene with H_2 in the presence of a nickel catalyst

(1)

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5. This question is about poly(chloroethene), commonly known as PVC.

(a) Give an equation, showing structural formulas, for the conversion of chloroethene into poly(chloroethene).

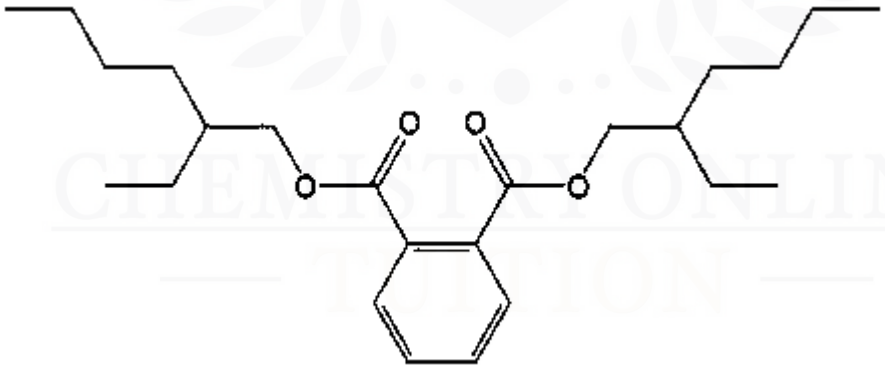
(3)

(b) State what you would observe if bromine water was added to poly(chloroethene).

Explain this observation.

(2)

(c) Plasticisers are often added during the manufacture of PVC. The structure of the plasticiser DEHP is shown.



Deduce the molecular formula of DEHP and state why a plasticiser is added to PVC.

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(2)

6. Propene reacts with hydrogen bromide to form a mixture of saturated organic products.

The proton n.m.r. spectrum of the major organic product has

A. 3 peaks with relative intensities 3 : 2 : 2
B. 2 peaks with relative intensities 3 : 4
C. 3 peaks with relative intensities 3 : 1 : 3
D. 2 peaks with relative intensities 6 : 1

(1)

7. Prop-2-en-1-ol is a natural chemical found in garlic. It is also used in the production of plasticisers.

(a) Prop-2-en-1-ol can be prepared by reacting 3-chloroprop-1-ene with dilute aqueous sodium hydroxide.

Name the mechanism for this reaction.

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(1)

(b) Prop-2-en-1-ol can also be formed from $HOCH_2CH_2CH_2OH$ in the presence of an acid catalyst.

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$HOCH_2CH_2CH_2OH \longrightarrow CH_2{=}CHCH_2OH + H_2O$

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Name and outline a mechanism for this reaction.

(4)

8. Which one of the following mechanisms is not involved in the reaction sequence below?

$CH_3CH_3 \rightarrow CH_3CH_2Cl \rightarrow CH_3CH_2OH \rightarrow CH_2{=}CH_2 \rightarrow CH_3CH_2Br$

A. electrophilic addition
B. electrophilic substitution
C. nucleophilic substitution
D. free-radical substitution

(1)

9. Name and outline a mechanism for the following conversion.

$$CH_3CH_2CH_2Br \xrightarrow{NH_3} CH_3CH_2CH_2NH_2$$

(5)

10. Which one of the following does not contain any delocalised electrons?

A. poly(propene)
B. benzene
C. graphite

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D. sodium

(1)

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