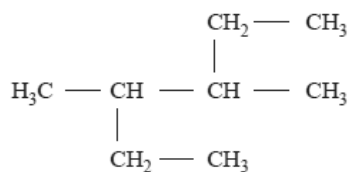


Organic exercises (2010 VCE)

1) What is the correct systematic name for the following compound?



- A. 2-ethyl-3-methylpentane
- B. 3-methyl-4-ethylpentane
- C. 3,4-dimethylhexane
- D. 2,3-diethylbutane

Solution.

2) For which one of the following molecular formulas is there only one possible structure?

- A. C_2HCl_3
- B. $\text{C}_2\text{H}_4\text{Cl}_2$
- C. $\text{C}_2\text{H}_2\text{Cl}_2$
- D. $\text{C}_4\text{H}_9\text{OH}$

Solution

3) An organic compound reacts with both dilute hydrochloric acid and dilute sodium hydroxide solution.

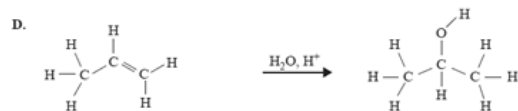
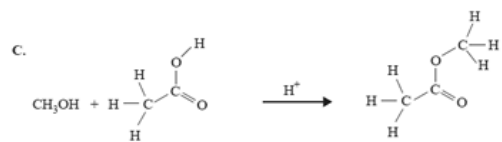
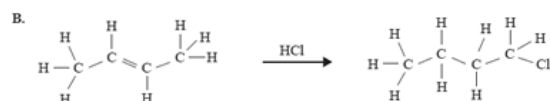
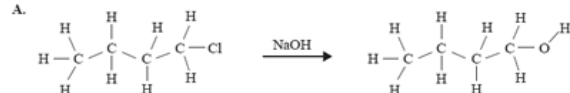
The compound could be

- A. $\text{C}_3\text{H}_7\text{Cl}$
- B. $\text{C}_3\text{H}_7\text{NH}_2$
- C. $\text{C}_4\text{H}_9\text{COOH}$
- D. $\text{H}_2\text{NCH}_2\text{COOH}$

Solution will appear here

Solution

4) Which one of the following organic reactions does not result in the product shown on the right-hand side of the reaction?



Solution

5) The following are incomplete and unbalanced equations representing three types of chemical reactions that involve glucose. In reactions 1 and 3, product A is the same compound. In reactions 2 and 3, product B is the same compound.

reaction 1 $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq}) \rightarrow \text{C}_2\text{H}_5\text{OH}(\text{aq}) + \text{product A}$

reaction 2 $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq}) \rightarrow \text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{aq}) + \text{product B}$

reaction 3 $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq}) \rightarrow \text{product A} + \text{product B}$

Which one of the following correctly names reaction 3 and identifies product A and product B?

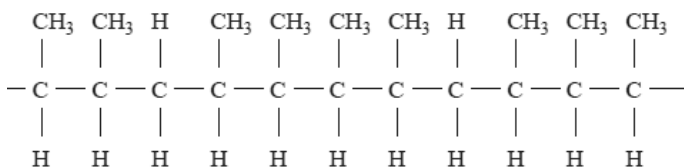
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	Reaction 3	Product A	Product B
A.	fermentation	water	carbon dioxide
B.	fermentation	carbon dioxide	water
C.	combustion	water	carbon dioxide
D.	combustion	carbon dioxide	water

Solution

6) Copolymers are obtained when two or more different monomers are allowed to polymerise together.

Part of a copolymer chain is shown below.



Solution will appear here

The two alkenes that could react together to form this polymer are

- A. propene and but-1-ene.
- B. propene and but-2-ene.
- C. but-1-ene and but-2-ene.
- D. pent-2-ene and but-2-ene.

Solution

7) a. Biodiesel is an alternative to standard diesel fuel. Biodiesel is made from biological ingredients instead of petroleum. Biodiesel is usually made from plant oils or animal fats through a series of chemical reactions.

In one process a common triglyceride in palm oil, known as POP, is reacted with methanol in the presence of potassium hydroxide as a catalyst. The result is a mixture of methyl esters of the fatty acids (biodiesel).

i. The value of the stoichiometric ratio

$$\frac{\text{number of moles of methanol}}{\text{number of moles of POP}}$$

Solution will appear here

is

Solution

ii. Calculate the volume, in litres, of methanol (density = 0.79 g mL^{-1}) required to react completely with 10.0 kg of the triglyceride POP ($M_r = 833$) to produce glycerol and the mixture of methyl esters.

Solution

[Click for the assessor's comments](#)

b. Cervonic acid is a polyunsaturated fatty acid found in fish oil. The number of carbon-carbon double bonds in a molecule of cervonic acid can be determined by titration with iodine, I_2 , solution. An addition reaction takes place between the double bonds in cervonic acid and iodine.

20.00 mL of 0.300 M I_2 solution reacted exactly with 0.328 g of cervonic

acid. The molar mass of cervonic acid is 328.0 g mol^{-1} .

i. Calculate the number of double bonds in a molecule of cervonic acid.

Solution

[Click for the assessor's comments](#)

There are 22 carbon atoms in a molecule of cervonic acid.

ii. What is the formula of cervonic acid?

Solution

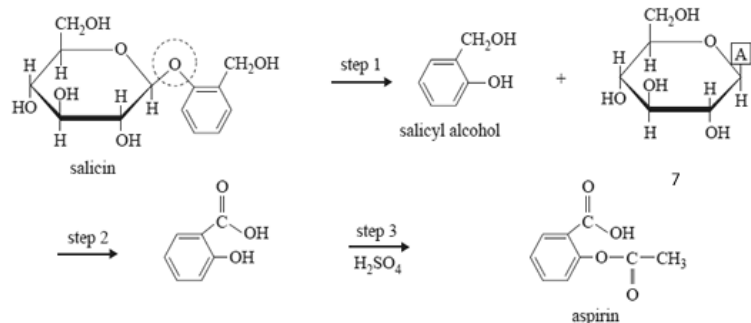
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8) Since ancient times, the bark of willow trees has been used for pain relief. In the 19th century, chemists isolated the active compound, salicin, from the bark. This was eventually converted into aspirin, which is now a widely used drug.

The reaction scheme below shows the steps used to carry out the

Solution will appear here

conversion.



a. What type of linkage is circled in the structure of salicin? (1 mark)

[Solution](#)

b. In step 1, salicylic acid and another compound is produced.

i. What group of biomolecules does this other compound belong to?

[Solution](#)

ii. The structure of this other compound is not complete. Write the formula of the atom or group of atoms represented by A in the reaction scheme above.

(1 + 1 = 2 marks)

[Solution](#)

c. Step 2 involves the conversion of salicylic acid into salicylic acid.

i. What type of reaction is step 2?

[Solution](#)

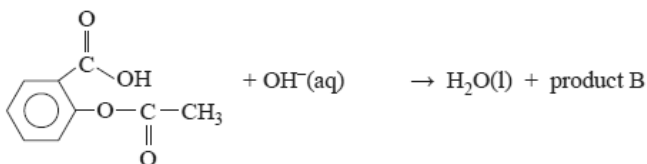
ii. Suggest a suitable reagent to carry out the reaction. (1 + 1 = 2 marks)

[Solution](#)

d. Step 3 requires sulfuric acid catalyst and another reagent. Name this reagent. (1 mark)

[Solution](#)

e. Aspirin reacts with a strong base according to the equation



Draw the structure of product B

[Solution](#)

9) The boiling points of several alkanols are provided in the following table.

Alkanol	methanol	ethanol	propan-1-ol	butan-1-ol	pentan-1-ol
Boiling point ($^{\circ}\text{C}$)	64.5	78.3	97.2	117.2	138.0

A mixture of two of these alkanols is to be separated in an experiment using fractional distillation. The mixture is placed into the distillation apparatus at room temperature and then gently heated. The first fraction is collected at 97.2°C .

a. i. Identify one alkanol that could not be present in this mixture.

[Solution](#)

ii. By specifically referring to this experiment, explain why the alkanol identified in part i. could not be present. (1 + 1 = 2 marks)

[Solution](#)

b. Provide one reason why the distillation flask should not be heated using a bunsen burner. (1 mark)

[Solution](#)

c. Butane and propan-1-ol have similar molar masses. The boiling point of butane is -138.4°C and that of propan-1-ol is 97.2°C . Explain, in terms of intermolecular forces, the difference between the boiling points of these two compounds. (3 marks)

[Solution](#)

[Click for the assessor's comments](#)

Solution will appear here