Unit 10 · Alcohols

WORKSHEET

Full marks 33

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 33

1 Key words [4]

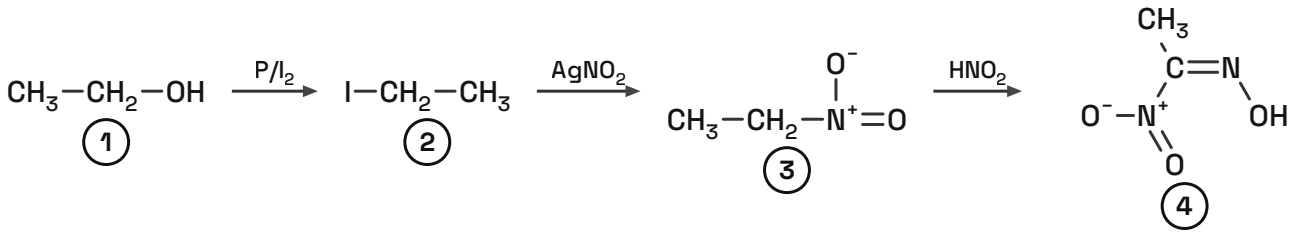
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

absolute alcohol	denatured alcohol	esterification	fermentation	hydroboration
invertase	Lucas reagent	power alcohol	primary	zymase

An alcohol whose –OH is on a carbon joined to only one other carbon is a _____ alcohol. Ethanol of 99.5% or more is _____, and ethanol mixed with petrol as a motor fuel is _____. Ethanol made unfit to drink by adding methanol is _____. Yeast turns glucose into ethanol and carbon dioxide by _____, with the enzyme _____. The reaction of an alcohol with a carboxylic acid, with a little concentrated sulphuric acid, is _____. A mixture of concentrated hydrochloric acid and anhydrous zinc chloride, which tells 1°, 2° and 3° alcohols apart, is _____.

2 Label the diagram [2]

The diagram shows a primary alcohol going through the steps of Victor Meyer's test. Write what belongs in place of 1 to 4. Each carries 0.5 mark.



1. _____ **2.** _____

3. _____ **4.** _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. The IUPAC name of $(CH_3)_2C(OH)CH_2CH_3$ is: [1]

a. 3-methylbutan-3-ol **b.** 2-methylbutan-2-ol

c. pentan-2-ol **d.** 2,2-dimethylpropan-1-ol

ii. A ketone reacts with a Grignard reagent, and the product is treated with water. The product is: [1]

a. a primary alcohol **b.** a secondary alcohol

c. a tertiary alcohol **d.** an aldehyde

iii. An alcohol turns Lucas reagent cloudy at once, at room temperature. It is: [1]

a. methanol **b.** a primary alcohol

c. a secondary alcohol **d.** a tertiary alcohol

iv. Ethanol is heated with excess concentrated sulphuric acid at 140 °C. The main organic product is: **[1]**

a. ethene **b.** ethoxyethane

c. ethanal **d.** ethyl hydrogen sulphate

v. Propene is treated with diborane, and then with hydrogen peroxide and sodium hydroxide. The alcohol formed is: **[1]**

a. propan-1-ol **b.** propan-2-ol

c. propane-1,2-diol **d.** 2-methylpropan-2-ol

4 Short answers **[7]**

Write short answers to the following questions.

a. What is absolute alcohol? Why can't it be made by simple distillation of a fermented liquid? **[2]**

b. What do propan-1-ol and propan-2-ol give when oxidized with acidified potassium dichromate? What color change is seen? **[2]**

c. Write balanced equations for the reactions of ethanol with: a. sodium; b. phosphorus pentachloride; c. ethanoic acid, with a little concentrated sulphuric acid. **[3]**

5 Long answer [4]

Write a long answer to the following question.

How do primary, secondary and tertiary alcohols differ when their vapor is passed over hot copper at 300 °C? Write an equation for each, using ethanol, propan-2-ol and 2-methylpropan-2-ol. How does this help to tell them apart?

6 Numerical problems [8]

Solve the following problems. Show your working. Take H = 1, C = 12, O = 16; one mole of a gas at STP fills 22.4 L.

a. 90.0 kg of glucose is fermented with yeast: $C_6H_{12}O_6 \xrightarrow{\text{zymase}} 2\,C_2H_5OH + 2\,CO_2$ [4]

i. Find the mass of ethanol formed if the reaction were complete.

ii. Find the volume of carbon dioxide given off at STP.

iii. The yield is 85%. What mass of ethanol is obtained, and what is its volume? (Density of ethanol 0.79 g/mL.)

iv. How many liters of E10 petrol (10% ethanol by volume) can this ethanol make?

Answer:

b. 0.60 g of a saturated monohydric alcohol reacts completely with sodium and gives 112 mL of hydrogen at STP. **[4]**

i. How many moles of hydrogen are formed?
ii. Find the molar mass of the alcohol.
iii. Find its molecular formula, and name its two alcohol isomers.
iv. Which of the two gives a ketone on oxidation? Name the ketone.

Answer: _____

7 Think **[3]**

2-methylpropan-2-ol turns Lucas reagent cloudy at once, faster than any other kind of alcohol, yet it is not oxidized by acidified potassium dichromate at all. Explain both facts from its structure.

8 Activity: Alcohol and water (not marked)

In the laboratory, add 2 mL of each alcohol to 2 mL of water in a test tube, shake, and let it stand: methanol, ethanol, propan-1-ol, butan-1-ol and pentan-1-ol (or as many of them as your laboratory has).

Alcohol	Number of carbons	Mixes completely or forms two layers?
Methanol		
Ethanol		
Propan-1-ol		
Butan-1-ol		
Pentan-1-ol		

Why do the small alcohols mix with water, and why does a longer chain make an alcohol less soluble?