

P525/2
Chemistry
PAPER 2
2 ½ HOURS

ELITE JOINT MOCK EXAMINATION BOARD 2016
Uganda Advanced Certificate of Education
CHEMISTRY
PAPER 2
2Hours 30minutes

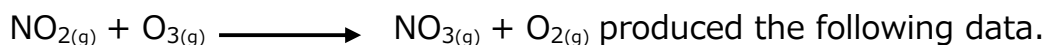
INSTRUCTIONS TO CANDIDATES

- ✓ Answer five questions including **three** questions from section A and any **two** from section B.
- ✓ Begin each question on a fresh page.
- ✓ Mathematical tables and graph papers are provided.
- ✓ Illustrate your answers with equations where applicable.
- ✓ Indicate the questions attempted in the grid below.

Questions Attempted						Total. marks
Marks						

1. (a) (i) Distinguish between **order of reaction** and **molecularity** of a reaction (2marks)

- (ii) State any two methods of determining order of a reaction. (2 marks)
- (b) Describe an experiment that can be used to determine that can be used to determine the order of reaction for the reaction between iodine and Propanone. (5 ½ marks)
- (c) The reaction;



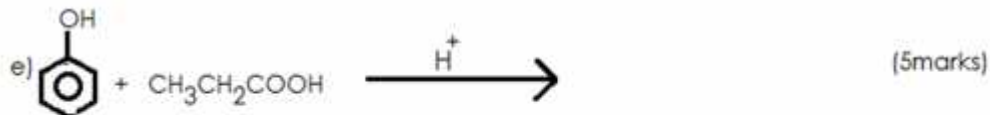
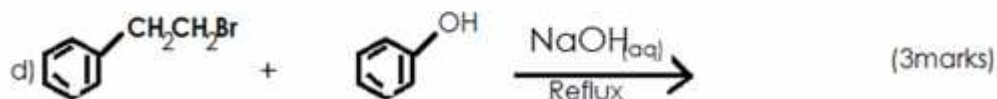
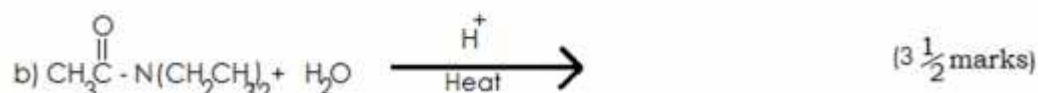
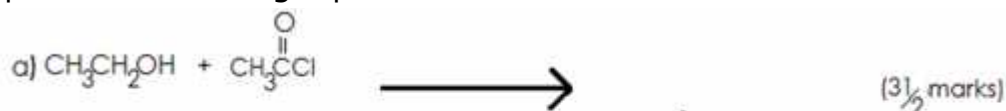
Experiment	Initial concentration of NO_2 (mol dm^{-3})	Initial concentration of O_3 (mol dm^{-3})	Initial rate ($\text{mol dm}^{-3} \text{s}^{-1}$)
1	0.38	0.38	6.3
2	0.21	0.79	6.3
3	0.21	1.39	12.5

Determine the rate equation for the reaction. (3 marks)

(d) State and explain how the following factors affect rate of reaction.

- (i) Increase in temperature (2 ½ marks)
- (ii) Increase in reagent concentration (2 ½ marks)
- (iii) Addition of a catalyst (2 ½ marks)

2. Complete the following equations and write a mechanism for each.



3. The elements Beryllium and magnesium belong to group II of the periodic table.
- (a) Describe the reaction of the elements with
- (i) Water (5marks)
 - (ii) Sodium hydroxide (3marks)
 - (iii) Air (4marks)
- (b) State and explain the trend in solubility down group II of their:
- (i) Hydroxides (2 ½ Marks)
 - (ii) Sulphates (2 ½ marks)
- (c) Name one reagent that can be used to distinguish between Mg^{2+} and Be^{2+} ions in solution and in each case state what is observed. (2marks)
4. (a) An organic compound, Z, contains 80% carbon, 6.7% hydrogen and the rest being oxygen. When Z was steam distilled at 97°C and 760mmHg, the distillate contained 47.47% of Z by mass. (Vapor pressure of water at 97°C is 723 mmHg)
- Determine the;
- (i) Empirical formula of Z (3marks)
 - (ii) Relative molecular mass of Z. (2 ½ marks)
 - (iii) Molecular formula of Z. (1 ½ marks)
- b) Z burns with a sooty flame and reacts with aqueous sodium hydrogen sulphite but does not react with ammoniacal silver nitrate solution.
- (i) Identify Z (1mark)
 - (ii) Write equation for the reaction between Z and sodium hydrogen sulphite. Then outline a mechanism for the reaction. (5marks)
- c) Using equations and stating conditions, show how Z can be prepared from;
- (i) Benzene. (1 ½ marks)
 - (ii) Phenyl ethane (3marks)
 - (iii) Benzoic acid (2 ½ marks)

SECTION B

✓ **Answer any two questions**

5. (a) Define the term **eutectic mixture**. (1mark)

(b) The table below shows the melting points of various mixtures of tin and lead.

% of tin	0	20	40	70	80	100
Melting point / °C	327	280	234	193	206	232

(i) Draw a well labelled melting point - composition diagram for tin – lead mixture. (5marks)

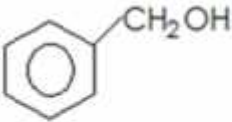
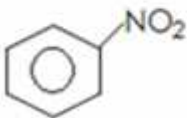
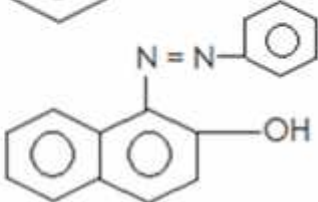
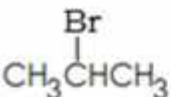
(ii) Use the diagram to determine the eutectic temperature and composition (3marks)

(c) Describe the phase changes that would happen when a liquid mixture containing 40% tin is gradually cooled from 400°C to 100°C. (6marks)

(d) (i) Name one other pair of elements which can give a similar phase diagram as tin-lead. (1mark)

(ii) State two similarities and two differences between a eutectic mixture and pure compound. (4marks)

6. Write equations to show how each of the following conversions can be effected and indicate the reagents and conditions for the reactions.

- a) $\text{CH}_3\text{CH}_2\text{Cl}$ to $\text{CH}_3\text{CH}_2\text{COOH}$ (3marks)
- b)  to  (3marks)
- c)  to  (5marks)
- d)  to $(\text{CH}_3)_2\text{C}=\text{N}-\text{OH}$ (3 1/2 marks)
- e) $\text{CH}_3\text{CH}_2\text{COOH}$ to $\text{CH}_3\text{CH}_2\text{NH}_2$ (3marks)
- f)  to  (2 1/2 marks)

7. (a) (i) Write the name and formula of one ore of zinc. (2marks)
- (ii) Describe how pure zinc can be obtained from the ore. (7marks)
- (b) Describe the reaction of zinc with
- (i) Water (2 1/2 marks)
- (ii) Sodium hydroxide. (2 1/2 marks)
- c) 7.5g of a zinc ore was dissolved in excess concentrated ammonia and the solution made up to 1dm^3 . The resultant solution was shaken with trichloromethane and left to settle. 50cm^3 of the organic layer needed 25cm^3 of 0.05M hydrochloric acid for neutralization. 25cm^3 of the aqueous layer was neutralized by 40cm^3 of 0.5M hydrochloric acid. Determine the percentage of zinc in the ore. (K_D of ammonia between water and trichloromethane is 25) (6marks)

8. Explain the following observations.
- a) Carbon dioxide is a gas at room temperature whereas silicon (IV) oxide is a solid with very high melting point. (4marks)
 - b) When sodium carbonate solution is added to iron (III) chloride solution, a reddish brown precipitate is formed with bubbles of a colorless gas. (5marks)
 - c) Iodine is sparingly soluble in water but dissolves readily in aqueous solution of potassium iodide (3marks)
 - d) Dimethyl amine is a stronger base than phenyl amine. (5marks)
 - e) The first ionization energy of phosphorous is higher than that of sulphur. (3marks)

END