

## S5 TOPICAL TEST 2024

### ALUMINIUM

**INSTRUCTIONS: ATEMPT ALL QUESTIONS**

**DURATION: 2 HOURS**

**NAME:** .....

**EXPECTED SCORE:** .....

1a(i). Write the formula and name of the ore from which aluminium can be extracted. (1 mark)

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(ii). Name two main impurities in the ore you have named in b(i). (1 mark)

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(b). In the experiment of aluminium, after the removal of the impurities, the ore is mixed with cryolite and then electrolyzed to extract aluminium.

(i). State the purpose of adding cryolite. (1 mark)

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(ii)Name the electrodes used in the electrolysis. (1 mark)

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(iii). Write an equation for the reaction that takes place at the cathode during electrolysis. (1 ½ marks)

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(c). Aluminium powder was added to dilute sodium hydroxide solution.

(i). State what was observed. (1 mark)

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(ii). Write equation for the reaction that took place. (1 ½ marks)

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(iii). Dry chlorine was passed over heated aluminium. Write an equation for the reaction that took place. (1 ½ marks)

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2(a). Describe how pure aluminium can be extracted from bauxite. Your answer should include equations for the reactions that took place.(Diagram not required)

(10 marks)

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b(i). Briefly describe how hydrated aluminium chloride  $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$  can be prepared from aluminium. (3marks)

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(ii). State what would be observed when hydrated aluminium chloride is strongly heated and write equation for the reaction that took place. (2 ½ marks)

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(iii). Explain what would be observed when sodium carbonate solution is added to a concentrated solution of aluminium chloride. (4 ½ marks)

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3. During the extraction of aluminum from its ore, the ore is first heated, powdered and then the powdered material is heated with sodium hydroxide solution and finally filtered.

(a). State why the;

(i). Ore is first heated before changing it to the powder. (1 mark)

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(ii). Powdered ore is heated with sodium hydroxide solution and filtered.

(2 marks)

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(b). Write equation for the reaction between the powdered ore and sodium hydroxide solution. (3 marks)

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(c). Briefly describe how pure aluminium can be obtained from the product from the reaction in (b). (Your answer should include equations) (8 marks)

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(d). Use equations to show how anhydrous aluminium chloride can be prepared.

(1 ½ marks)

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4(a). Discuss the reactions of aluminium with;

(3 ½ marks)

(i). Hydrochloric acid

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(ii). Sulphuric acid

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(iii). Nitric acid

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(b). Explain why aluminium utensils should not be washed using soap solutions.

(3 marks)

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(c). Write equations and state the conditions under which aluminium reacts with;

(i). air

(2 ½ marks)

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(ii). Sodium hydroxide

(2 ½ marks)

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(iii). Hydrochloric acid

(2 ½ marks)

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(d). State what is observed and write equations for the reaction which take place when aqueous ammonia is added dropwise to a solution containing aluminium ions. (2 ½ marks)

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(e). Write equation for the reaction that takes place when aluminium chloride is dissolved in water. (1 ½ marks)

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END

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