

SAMPLE ITEMS FOR A 'LEVEL CHEMISTRY

SECTION A

Item 1: Water Purification

You are a chemist working for a water treatment plant in Kampala. The plant uses a combination of coagulation, sedimentation, filtration, and disinfection to purify water from Lake Victoria. However, recent tests have shown that the water contains high levels of nitrates and phosphates, which can cause harm to humans and the environment.

- I. Identify the chemical reactions involved in the purification process.

- II. Explain the effects of nitrates and phosphates on human health and the environment.
- III. Suggest methods to remove nitrates and phosphates from the water.

Item 2: Energy Production

You are a chemist working for a power generation company in Uganda. The company uses a combination of fossil fuels (coal, oil, and gas) and renewable energy sources (hydro, solar, and wind) to generate electricity. However, the company wants to explore new energy sources to reduce its reliance on fossil fuels.

- 1) Explain the chemical reactions involved in the combustion of fossil fuels.
- 2) Discuss the advantages and disadvantages of different renewable energy sources.
- 3) Suggest new energy sources that the company could explore.

Item 3: Environmental Monitoring

You are a chemist working for the National Environment Management Authority (NEMA) in Uganda. NEMA is responsible for monitoring and managing the environment in Uganda. However, recent tests have shown that the air and water in Kampala are polluted with high levels of particulate matter, nitrogen dioxide, and sulfur dioxide.

- 1) Explain the chemical reactions involved in air and water pollution.
- 2) Discuss the effects of air and water pollution on human health and the environment.
- 3) Suggest methods to reduce air and water pollution in Kampala.

Item 4: Pharmaceutical Production

You are a chemist working for a pharmaceutical company in Uganda. The company produces a range of medicines, including antimalarial drugs, antibiotics, and painkillers.

However, the company wants to develop new medicines to treat diseases such as HIV/AIDS, tuberculosis, and cancer.

- 1) Explain the chemical reactions involved in the production of different medicines.
- 2) Discuss the importance of quality control in pharmaceutical production.
- 3) Suggest new medicines that the company could develop to treat different diseases.

Item 5: Food Security

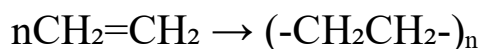
You are a chemist working for a food processing company in Uganda. The company produces a range of food products, including maize flour, rice, and sugar. However, the company wants to develop new food products to improve food security in Uganda.

- i. Explain the chemical reactions involved in food processing.
- ii. Discuss the importance of food safety and quality control.
- iii. Suggest new food products that the company could develop to improve food security.

SECTION B

Item 1: Mukwano Industries Ltd.

Mukwano Industries Ltd., a leading manufacturer of plastics and packaging materials in Uganda, wants to produce 1000 kg of polyethylene plastic. The reaction to produce polyethylene is:



If 500 kg of ethylene is required to produce 1000 kg of polyethylene, and the cost of ethylene is UGX 500 per kg:

- 1) Calculate the total cost of ethylene required to produce 1000 kg of polyethylene.
- 2) If the company wants to make a profit of 20% on the sale of polyethylene, and the selling price of polyethylene is UGX 1500

per kg, calculate the total revenue generated from the sale of 1000 kg of polyethylene.

Item 2: Nile Breweries Ltd.

Nile Breweries Ltd., a leading brewery in Uganda, wants to produce 1000 liters of beer. The fermentation reaction to produce beer is:

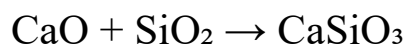


If 500 kg of malt is required to produce 1000 liters of beer, and the cost of malt is UGX 300 per kg:

- 1) Calculate the total cost of malt required to produce 1000 liters of beer.
- 2) If the company wants to make a profit of 30% on the sale of beer, and the selling price of beer is UGX 2000 per liter, calculate the total revenue generated from the sale of 1000 liters of beer.

Item 3: Hima Cement Ltd.

Hima Cement Ltd., a leading cement manufacturer in Uganda, wants to produce 1000 kg of cement. The reaction to produce cement is:

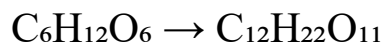


If 500 kg of limestone is required to produce 1000 kg of cement, and the cost of limestone is UGX 400 per kg:

1. Calculate the total cost of limestone required to produce 1000 kg of cement.
2. If the company wants to make a profit of 25% on the sale of cement, and the selling price of cement is UGX 1200 per kg, calculate the total revenue generated from the sale of 1000 kg of cement.

Item 4: Kakira Sugar Ltd.

Kakira Sugar Ltd., a leading sugar manufacturer in Uganda, wants to produce 1000 kg of sugar. The reaction to produce sugar is:



If 500 kg of sugarcane is required to produce 1000 kg of sugar, and the cost of sugarcane is UGX 350 per kg:

- 1) Calculate the total cost of sugarcane required to produce 1000 kg of sugar.
- 2) If the company wants to make a profit of 20% on the sale of sugar, and the selling price of sugar is UGX 1800 per kg, calculate the total revenue generated from the sale of 1000 kg of sugar.

Item 5: Uganda Breweries Ltd.

Uganda Breweries Ltd., a leading brewery in Uganda, wants to produce 1000 liters of beer. The fermentation reaction to produce beer is:



If 500 kg of malt is required to produce 1000 liters of beer, and the cost of malt is UGX 320 per kg:

- 1) Calculate the total cost of malt required to produce 1000 liters of beer.
- 2) If the company wants to make a profit of 25% on the sale of beer, and the selling price of beer is UGX 2200 per liter, calculate the total revenue generated from the sale of 1000 liters of beer.

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