



ST. FRANCIS HIGH SCHOOL-NAMAGOMA
UGANDA ADVANCED CERTIFICATE OF EDUCATION
END OF TERM TWO EXAMINATIONS 2025
SENIOR FIVE
CHEMISTRY
TIME: 2HOURS 30MINUTES

INSTRUCTIONS

Answer all items in this question paper

Use of relevant scores will earn you extra scores

Item 1

You are an intern in the research and development department of a pharmaceutical company. The company is developing new antiseptic compounds and inhalable drugs. Your supervisor presents you with data on solubility and boiling points of various phenol derivatives and group (VII) hydrides.

Part A: solubility of the chlorophenol isomers

Two antiseptic compounds 2-chlorophenol and 4-chlorophenol are being considered for use in a water-based skin lotion however during the solubility test, the lab finds that; 2-chlorophenol is significantly less soluble in water than 4-chlorophenol.

Part B: variation in boiling points of group (VII) hydrides

The lab tests came up with the boiling points of the group (VII) hydrides to evaluate their suitability in the inhalation therapy.

Compound	HF	HCl	HBr	HI
Boiling point(^o c)	19.9	-85.0	-66.7	-35.4

Task; As a chemistry learner, Explain the deviation in the results obtained in part A and Part B, give a recommendation to the company for the best products.

Item 2

You are working in the analytical chemistry section of a forensic science laboratory. Investigators recovered a liquid organic sample labelled compound Q from the scene of explosion. They suspect it's a volatile hydrocarbon derivative possibly an alcohol or ether used to ignite fire. To identify the compound, you perform a combustion experiment where the different data was obtained. 3.70g of compound Q with molar mass of 74g obtained from the tin was completely burnt in excess oxygen and it produced 4.50g of water and 6.48dm³ gaseous mixture. The gaseous mixture was then passed through concentrated potassium hydroxide solution and the volume decreased to

2.0dm³.

Task; As a chemistry student, you are required to determine the structural formula of compound Q and its possible isomers with their corresponding names that might have been picked from the scene.

Item 3

A team of analytical chemists is working for an environmental agency investing the lead content in soil samples mined near a residential area. The agency is concerned because lead poisoning in young children results into developmental delays, learning difficulties and behavioral problems, contaminates soil and water and many others. To determine the composition of lead in the ore and assess potential risks, the team uses a mass spectrometer to analyze the isotope content in the sample and obtained the following data.

isotope	Mass number	Relative isotopic mass
Pb-204	203.973	203.973
Pb-206	205.974	205.974
Pb-207	206.976	206.976
Pb-208	207.977	207.977

Task,

As a chemistry learner,

- Explain how the chemists used the instrument above to come up with those results
- Use the data obtained and calculate the relative atomic mass of lead in the sample to 4 significant figures.

Item 4

You are a student working in the chemistry laboratory investigating how the addition of anon-volatile solute(glucose) affects the vapor pressure of a solvent (water). During the experiment, you use a vapor pressure apparatus to measure the vapor pressure of pure water and that of aqueous glucose solutions with increasing masses of glucose dissolved in a fixed amount of water at constant temperature. You tabulated the results of the experiment.

Mass of glucose in 100g of water	0.0	1.0	2.0	3.0	4.0	5.0
Vapor pressure of solution (KPa)	3.17	3.13	3.09	3.05	3.01	2.97

The new student in your class found you with those results and seemed not to understand what was going on the importance of those results

Task; As a chemistry learner, help the new student to understand the results obtained, the law used to get those results, and the molecular mass of the solute used.

END

