**DEPARTMENT OF CHEMISTRY**

**S.5 END OF TERM 1**

**CHEMISTRY PAPER1**

**TIME: 2:30 MINUTES**

**Attempt all questions**

1. In early 2000s, pesticides were posing less or no threats at all to humans, but recent research suggests that foods obtained from gardens where pesticides have been used are a threat to human health because they stay long in plant tissue. A sample of the pesticides was taken for analysis using a mass spectrometer, organic compound known as dichloromethane was identified to be contained by the samples. The spectrometer shown relative lines at 84, 86 and 88 in the peak ratio of 9:6:1 respectively. As a chemistry student;

a). Describe the process followed to obtain the above results.

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b). Account for the presence of three lines of the different peaks.

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c). Calculate the molecular mass of dichloromethane.

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2. A hospital receives a supply of iodine-131, a radioactive isotope commonly used to treat thyroid disorders. Iodine -131 under goes beta decay goes beta decay to form xenon -131. As a chemistry student given initial mass of iodine-131 =10mg

After 24 days; only 2.5mg of iodine-131 remained

Iodine -131 decays via beta decay.

a). Write and balance the nuclear equation for the decay of iodine-131.

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b). Calculate the half-life of iodine -131.

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c) . After how many days will only 0.625 mg remains.

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d). The hospital has hos strict rules that no patient should receive iodine -131. If it has decayed below 50% of its original mass. The isotope was delivered at 8:00am and wasn’t used until 8:00pm. Was it still valid?

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**SECTION B**

3. A company is developing a new few additives designed to improve the efficiency of gasoline engines. To ensure the additive’s performance and chemical composition. The company conducted a combustion analysis on 0.50g of additive. The combustion produced 1.820g of carbon dioxide and 0.741g of water. As chemistry a chemistry student, given that gasoline is a hydrocarbon fuel with molecular mass of 114;

a). Determine its empirical and molecular formula to understand its chemical composition. (C=12, H=1).

b). a truck using gasoline engine was supplied with 90kg of oxygen and 48kg of fuel to run a distance of 100km . It’s ideally proven that for the truck to cover 100km, it should completely burn 48kg of fuel. As a chemistry student, establish whether the oxygen supplied was enough for the truck to cover the distance.

c). the gaseous product produced was adsorbed to prevent environment short comings .Determine the amount of the gaseous product was adsorbed.

End

By Nyangabyaki