B.O.T TERM II 2019
S.6 CHEMISTRY PAPER 1
TIME: 1 HOUR

***INSTRUCTIONS***

- *Attempt **all** questions*

1. (a) (i) Write the electronic configuration of chromium atomic number 24. *(1 mark)*

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(ii) State the types of bonding that exists in chromium (III) chloride. *(1 mark)*

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(b) By using equations only, chromium (III) chloride is acidic. *(2 ½ marks)*

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2. 20cm3 of 0.02m hydrochloric acid was added to 30cm$^3$ of 0.025m calcium hydroxide. Calculate;

(a) Molar concentration of the hydroxyl ions in the initial calcium hydroxide. *(2 marks)*

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(b) Concentration of the hydroxyl ions in the resultant solution. *(4 marks)*

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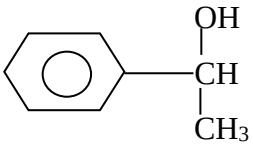
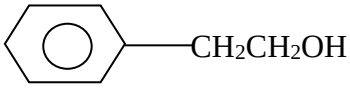
3. Name one reagent that can be used to distinguish between each of the following pairs of compounds and in each case state what would be observed if each of the members of the pair is treated with the reagent.

(a)  and 

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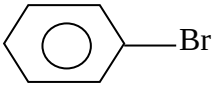
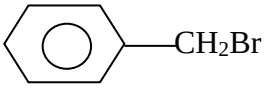
(b)  and 

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4. The convention of a cell is given below.

$Pt/Fe^{2+}(aq)\ //MnO^{-}_{4}(aq),\ Mn^{2+}(aq),\ H^{+}(aq)/Pt.$

(a) Write equations for the half cell reactions at the;-

(i) Anode *(1 mark)*

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(ii) Cathode *(1 mark)*

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(b) Write the overall equation for the reaction. *(1 ½ marks)*

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(c) The electrode potentials for the system $Fe^{2+}(aq)/Fe^{3+}(aq)$ and $Mn^{2+}(aq)/MnO^{-}_{4}(aq)$ are +0.76 and +1.52 volts respectively. Deduce whether the reaction inv(b) is feasible or not and give a reason for your answer. *(2 marks)*

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5. Lithium is in group (I) and Magnesium (II) of the periodic table but the two elements show some common chemical properties.

(a) Give three examples of the properties in which the two elements show similarities. *(3 marks)*

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(b) What name is given to the type of relationship in (a). *(1 mark)*

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(c) Give reasons why lithium resembles Magnesium in its chemical properties.

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6. 1.00dm$^3$ of aqueous solution contains 5.00g of butanoic acid. Partition coefficient of butanoic acid between water and Q is 0.2. Calculate the mass of butanoic acid extracted when the solution is shaken with;

(a) 50cm$^3$ of solvent Q. *(3 marks)*

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(b) 25cm$^3$ of solvent Q twice. *(4 marks)*

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