**SUKELLEMO JOINT PRE-MOCK**

**CHEMISTRY PAPER 2**

233/2

TIME: 2 HOURS.

NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

CLASS\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ HOUSE:\_\_\_\_\_\_\_\_\_\_\_\_

**Instruction to the candidates**

a) Write your Name and Index number, Admission Number and Class in the spaces provided at the top of this page.

b) Answer all the questions in the spaces in the space provided in this paper using English.

c) KNEC Mathematical tables and silent electronic calculators may be used.

d) All working MUST be clearly shown where necessary

FOR EXAMINERS USE ONLY

|  |  |  |
| --- | --- | --- |
| QUESTION | MAXIMUM SCORE | CANDIDATE SCORE |
| 1 | 14 |  |
| 2 | 12 |  |
| 3 | 13 |  |
| 4 | 14 |  |
| 5 | 12 |  |
| 6 | 15 |  |
| TOTAL | 80 |  |

1 .the grid below shows part of the periodic table. Study it and answer the questions that follow. (The letters are not the actual symbols of the elements)

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1. On the grid show the following elements. (6mks)
2. Element P with electron arrangement 2.8.1
3. Element T which forms a stable ion T3+  with electron arrangement 2.8
4. Element N which can form an unstable ion N- with electron arrangement 2.7
5. Element E the element which reacts most violently with water.
6. Element D, the nonmetal with the highest melting point in period three.
7. Element Q , the element with the highest first ionization energy.
8. 2211Na, 23 11Na and 24 11Na are isotopes of sodium

(i) Describe how these sodium isotopes are the same and how they are different in terms of the total number of protons, neutrons and electrons in each)

same.(2mks)

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Different(1mk)

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(ii) Why do all three isotopes have an overall charge of zero?(1mk)

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(iii) Why do all three isotopes have the same chemical properties? (1mk)

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(iv) Why do sodium ions have a charge of +1? (1mk)

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(b) Carbon is an element which exists in different forms.

(i) Name two forms of the element carbon that have giant covalent structures(1mk)

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(ii) Name the oxide of carbon that is a toxic gas.

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1. a) State Le Châteliers principle. ( 1mk)

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b)Explain how an increase in temperature affects the rate of a chemical reaction.(2mks)

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c). The reaction between ethane and oxygen is vigorous but the ethane needs to be ignited first. Explain. (2mks)

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d) During the reaction between excess magnesium and dilute hydrochloric acid the volume of hydrogen produced was recorded after every minute up to after three minutes after the reaction was over. A graph of volume of hydrogen produced was plotted against time in minutes.

1. Describe the shape of the graph. (2mks)

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1. Explain how the rate of the reaction at the second minute can be determined using the graph. (2mks)

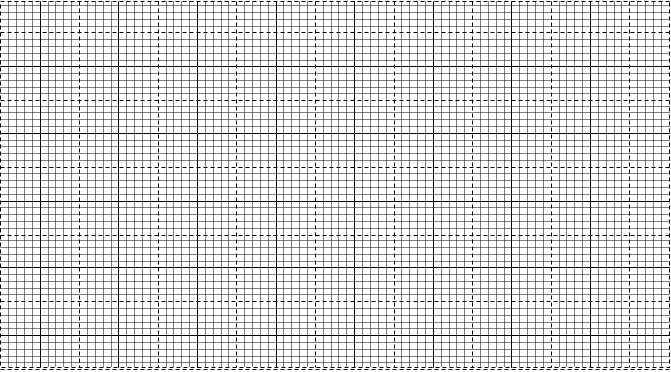
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1. Draw a set-up that can be used to carry out the above experiment. (3mks)

3 a) The data below shows the solubility of potassium chlorate V in 100g water at different temperatures.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Solubility in g /100g water | 8 | 10 | 14 | 20 | 40 |
| Temperature (OC ) | 25 | 31 | 38 | 52 | 88 |

i) On the grid below plot a graph of solubility (y axis) against temperature(3mks)



ii) Determine the solubility of the solubility at 700C (1mk)

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iii) 400g saturated solution at 880C is cooled to 100C. Determine the mass of crystals obtained (3mks)

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b) A solution of ammonia in water is an electrolyte whereas a solution of ammonia in methylbenzene is not. Explain. (2mks)

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c ) Copper(II) ions react with excess aqueous ammonia to form a complex ion.  
 (i) Write an equation for the reaction that forms the complex ion. (1mk)

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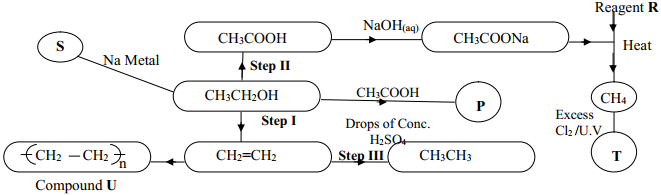
(ii) Name the complex ion. (1mk)

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(b) Explain why CH4 is not acidic while HCl is acidic yet both compounds contain hydrogen(2mk)

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4. Study the figure below and answer the questions that follow.



i)Write the formula of the organic compounds P and S (2mks)

P:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

S:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii)Name the type of reaction, the reagent(s) and condition for the reactions in the following steps (4mks)

Step I \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Step II

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iii)Name reagent R\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_1mk)

iv)Draw the structural formula of T and give its name(2mks)

v)Name compound U\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (.1mk)

vi)If the relative molecular mass of U is 42000, determine the value of n (C=12, H=1) (2mks)

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5. a) The enthalpies of ethane carbon and hydrogen combustion are -1250, -393 and -286 kJ/mol respectively.

I)Draw an energy cycle diagram linking the heat of combustion of ethane carbon and hydrogen and the heat of formation of ethane.(2mks)

ii)Use the energy cycle to calculate the molar heat of the formation of ethane. .(2mks)

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iii)Present the above information in an energy level diagram .(2mk)

b) Calculate the enthalpy of formation of solid MOH given

(3MKS)

M(S)+H2O(l)-🡪MOH(aq)+1/2 H2(g) -202kJ/mol

H2(g)+1/2O2(g)-🡪H2O(l)  -286kJ/mol

MOH(s)🡪MOH(aq) -55kJ/mol

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1. State two measures taken to reduce pollution by vehicles. (2mks)

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6 a )The heat of solution of magnesium chloride is -180kJ/mol. . given that the lattice energy of magnesium chloride is 2493kJ/mol and the hydration energy of magnesium is -1891kJ/mol.

1. Draw an energy cycle diagram to show this information. (2mks)
2. Calculate the hydration energy of a chloride ion. (2mks)

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1. Draw an energy level diagram to represent the above information. (3mks)

b)starting with glucose describe how absolute ethanol can be prepared. (4mks)

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c.) Starting with dodecene describe how the soapless detergent sodium alkylbenzene sulphonate can be prepared.(4mks)

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