

# SOUTH EASTERN KENYA UNIVERSITY

# **UNIVERSITY EXAMINATIONS 2016/2017**

## SECOND SEMESTER EXAMINATION FOR THE DEGREE OF

# **BACHELOR OF SCIENCE (CHEMISTRY) AND**

# **BACHELOR OF EDUCATION (SCIENCE)**

### SCH 201: CHEMISTRY OF THE MAIN BLOCK ELEMENTS

DATE: 21<sup>ST</sup> APRIL, 2017 TIME: 8.00-10.00 A.M

### **INSTRUCTIONS TO CANDIDATES**

- (a) Answer <u>question One</u> and any other <u>Two questions</u>
- (b) Question 1 <u>carries 30 marks</u> while the other questions <u>carry</u> <u>20 marks</u> each
- (c) Illustrate your answers with well labeled diagrams where appropriate

### **QUESTION 1 (30 MARKS)**

- (a) Explain the following, giving appropriate reasons;
  - (i) The oxidising character of elements increases and reducing character decreases as we move from left to right in a period (3 marks)
  - (ii) Metallic character of *p*-block elements decreases along a period but increases down a group.(3 marks)
- (b) Explain the reason for lithium having a greater tendency to form covalent compounds than the other elements in the group. (3 marks)
- (c) Explain why Group II elements are smaller than their Group I counterparts. (3 marks)
- (d) Describe the difference in structure between  $BeH_2$  and  $CaH_2$ . (4 marks)

- (e) The first element in each of the main groups in the periodic table shows anomalous properties when compared with other members of the same group. Discuss this statement with particular reference to Be. (5 marks)
- (f) Give equations to show what reactions occur between CO and:
  - (i)S (2 marks)
  - (ii)Ni (2 marks)
- (g) Explain why nitrogen molecules have the formula N<sub>2</sub>, whilst phosphorus has the formula P<sub>4</sub>.(5 marks)

#### **QUESTION 2 (20 MARKS)**

	(a) Describe how you would make lithium hydride	<b>.</b>	(6 marks)					
	(b) Explain four properties of alkali hydrides.		(4 marks)					
	(c) Explain why Group II elements are harder, an and boiling points than Group I elements.	Explain why Group II elements are harder, and why they have h and boiling points than Group I elements.						
	(d) Explain why compounds of Be are much more compounds.	vhy compounds of Be are much more covalent than other ds.						
	(e) Explain why the halides and hydrides of Be po	lymerize.	(2 marks)					
QU	QUESTION 3 (20 MARKS)							
	(a) List <b>four</b> uses of aluminium.		(4 marks)					
	(b) Explain the following:							
	(i)BF <sub>3</sub> has no dipole moment, but $PF_3$ has a sub-	ostantial dipole.	(2 marks)					
	(ii)BF <sub>3</sub> and BrF <sub>3</sub> molecules have different shap	bes.	(2 marks)					
	(c) Explain features which make borax a useful principal end of the second seco	imary standard	(2 marks)					
	(d) Account for the reasons why $CO_2$ is a gas and $S$	$SiO_2$ is a solid.	(4 marks)					
	(e) Explain why CCl <sub>4</sub> is unaffected by water whi	ilst SiCl <sub>4</sub> is rapidly	hydrolysed. (4 marks)					

(f) Explain why SnI<sub>4</sub> is an orange coloured solid when CCl<sub>4</sub> and SiBr<sub>4</sub> are colourless liquids.
 (2 marks)

#### **QUESTION 4 (20 MARKS)**

(a) Explain the properties to account for the abnormal behaviour of carbon

(b) Explain why the dissociation energy of F2 is less than that of Cl2(7 marks)(c) Give reasons to account for stability of clathrates(5 marks)(d) Explain why the vapour of all halogens is coloured(4 marks)

#### **QUESTION 5 (20 MARKS)**

(a)	List the main uses of fluorine.	(4 marks)
(b)	Explain the bond angle in $OF_2$ and give a reason why it is differ	ent in Cl <sub>2</sub> O. (4 marks)
(c)	State the main uses of Cl <sub>2</sub> .	(3 marks)
(d)	Explain reasons why the only binary compounds of the nobl fluorides and oxides of Kr, Xe and Rn.	e gases are (4 marks)
(e)	Give equations to show the reactions between sodium and:	
	(i)H <sub>2</sub> O	(2 marks)
	(ii)Graphite	(2 marks)

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