



MACHAKOS UNIVERSITY

University Examinations 2019/2020 Academic year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF EDUCATION (SPECIAL EDUCATION)

BACHELOR OF EDUCATION (SCIENCE)

SCH 300: COMPARATIVE STUDY OF S and P BLOCK ELEMENTS

DATE: 29/11/2019

TIME: 8.30-10.30 AM

INSTRUCTIONS TO CANDIDATES

- The paper consists of **two** sections.
- Section **A** is **compulsory**.
- Answer any two questions from section **B**.
- Find Periodic Table on the last Page.

SECTION A: COMPULSORY

QUESTION ONE (30 MARKS)

- a) Explain the meaning of Periodic law. (3 marks)
- b) Explain the application of Aufbau Principle and Hund's Rule in electronic configuration: (4 marks)
- c) What do the following terms mean?
- i. Tetrels
 - ii. Pnictogens
 - iii. Chalcogens (3 marks)
- d) By defining active metals, state the products of their reaction with acids. (2 marks)
- e) Explain the connection between polarization and covalency (2 marks)
- f) Despite the fact that Ga^{3+} is lower in group 3, its size is closer to that of Al^{3+} . Explain (3 marks)
- g) Li forms Li_3N while the other group 1 elements do not. Explain (3 marks)

- h) The F-F bond is weaker than the Cl-Cl bond. Explain (3 marks)
- i) H-F is a weak acid. Explain (3 marks)
- j) Nitrogen and oxygen have the same atomic radius and yet oxygen has a lower ionization energy. Explain (2 marks)
- k) Differentiate between coso- and nico- terms as used in the naming of boranes (2 marks)

QUESTION TWO (20 MARKS)

- a) What factors favor the formation of ionic compounds between alkali metals and non-metals? (4 marks)
- b) Alkyl and aryl derivatives of Na, K, Ru are non-volatile while those of Li are low melting. Explain (4 marks)
- c) Explain why the group 2 elements are harder than those of group 1 (4 marks)
- d) Discuss the manufacture of Sodium by Down's process (8 marks)

QUESTION THREE (20 MARKS)

- a) Boron unlike Aluminium cannot form B^{3+} . Explain (4 marks)
- b) When $AlCl_3$ is added to water it forms an acidic solution. Explain (4 marks)
- c) Explain what you understand by Inert pair effect (4 marks)
- d) Explain the key factor that leads to the decrease in melting points down group 3 (4 marks)
- e) PbI_4 and $PbBr_4$ do not exist. Explain (4 marks)

QUESTION FOUR (20 MARKS)

- a) There is a considerable increase in covalent radius from N to P. However, from As to Bi only small increase in covalent radius is observed. Explain (4 marks)
- b) Explain why PF_5 forms while NF_5 does not (4 marks)
- c) Explain your understanding of the following;
 - i. The Shielding Effect
 - ii. Effective Nuclear Charge. (8 marks)
- d) O_2 is gaseous while other members of group 6 are not (4 marks)

QUESTION FIVE (20 MARKS)

- a) In each period, it is the halogen atom that has the smallest size. Explain (5 marks)
- b) Explain why Cl has higher electron affinity than F (5 marks)
- c) What are some of the main uses of the Noble Gases (4 marks)
- d) Discuss the Kr-F compounds (6 marks)

1																		18																	
1 H 1.0079		2																2 He 4.0026																	
3 Li 6.941		4 Be 9.0122																																	
11 Na 22.990		12 Mg 24.305		3																															
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19 K 39.098		20 Ca 40.078		21 Sc 44.956		22 Ti 47.867		23 V 50.942		24 Cr 51.996		25 Mn 54.938		26 Fe 55.845		27 Co 58.933		28 Ni 58.693		29 Cu 63.546		30 Zn 65.409		31 Ga 69.723		32 Ge 72.64		33 As 74.922		34 Se 78.96		35 Br 79.904		36 Kr 83.798	
37 Rb 85.468		38 Sr 87.62		39 Y 88.906		40 Zr 91.224		41 Nb 92.906		42 Mo 95.94		43 Tc (98)		44 Ru 101.07		45 Rh 102.91		46 Pd 106.42		47 Ag 107.87		48 Cd 112.41		49 In 114.82		50 Sn 118.71		51 Sb 121.76		52 Te 127.60		53 I 126.90		54 Xe 131.29	
55 Cs 132.91		56 Ba 137.33		57-71 *		72 Hf 178.49		73 Ta 180.95		74 W 183.84		75 Re 186.21		76 Os 190.23		77 Ir 192.22		78 Pt 195.08		79 Au 196.97		80 Hg 200.59		81 Tl 204.38		82 Pb 207.2		83 Bi 208.98		84 Po (209)		85 At (210)		86 Rn (222)	
87 Fr (223)		88 Ra (226)		89-103 #		104 Rf (261)		105 Db (262)		106 Sg (266)		107 Bh (264)		108 Hs (270)		109 Mt (268)		110 Ds (281)		111 Rg (272)		112 Uub (285)		113 Uut (284)		114 Uuq (289)		115 Uup (288)		116 Uuh (291)		118 Uuo (294)			

# Actinide series	* Lanthanide series														
	57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
	89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)