



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

UNIVERSITY SUPPLEMENTARY EXAMINATIONS

2021/2022 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF**

**BACHELOR OF SCIENCE (CHEMISTRY) & BACHELOR OF
EDUCATION SCIENCE**

COURSE CODE: SCH 111

COURSE TITLE: INORGANIC CHEMISTRY

DATE: 02/08/2022

TIME: 8.00-10.00 AM

INSTRUCTIONS TO CANDIDATES

Total Marks: 70

Answer all the Questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

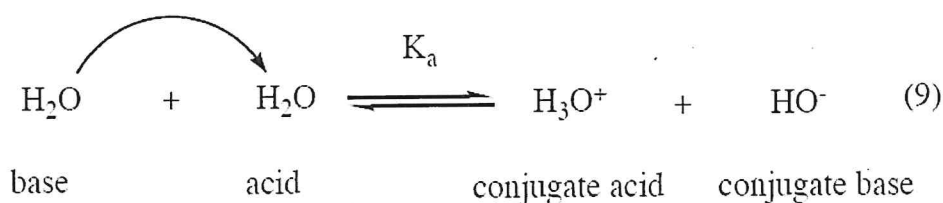
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(b.) Write the condensed electron configuration for the following atoms and determine the number of unpaired electrons in each by filling in the energy levels. (4 marks)

(i) Ca

(ii) Al

(c) Given the following reaction where by two water molecules react to form hydroxide anion and hydronium, write the equation for the equilibrium constant of the process, (2 marks)



(d) Predict the molecular geometry for the following molecules: (3 marks)

i. XeF₄

ii. CS₂

iii. BH₃

(e) Give the difference between the following terms as used in complex ions.

(i) polydentate ligand and polyatomic ion. (2marks)

(ii) A dipole and Vander waals forces (2 marks)

f) Determine the formulas of the following compounds

(3mks)

i) Tetrachloronickelate (II)

ii) Hexacyanoferrate (III)

iii) Tetraammine di-aquacuprate (II)

QUESTION THREE (17 Marks)

Elements of the Periodic Table

		1A (1)																8A (18)							
1	1	H 1.008	2A (2)																	2 He 4.003					
2	3	Li 6.941	4 Be 9.012																	5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
3	11	Na 22.99	12 Mg 24.31	3B (3)		4B (4)		5B (5)		6B (6)		7B (7)		8B (8) (9) (10)			1B (11)	2B (12)	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95	
4	19	K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80						
5	37	Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3						
6	55	Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)						
7	87	Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 (269)	111 (272)	112 (277)	As of mid-1999, elements 110 through 112 have not yet been named.											

6	Lanthanides	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
7	Actinides	90 Th 232.0	91 Pa (231)	92 U 238.0	93 Np (237)	94 Pu (242)	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 (260)



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Main CAMPUS

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

MAIN EXAMINATION

FOR THE DEGREE

OF

MASTER OF SCIENCE IN CHEMISTRY

COURSE CODE: SCH 850: Advanced Environmental Chemistry

DATE: 01/08/2022

TIME: 2.00-5.00 pm

INSTRUCTIONS TO CANDIDATES

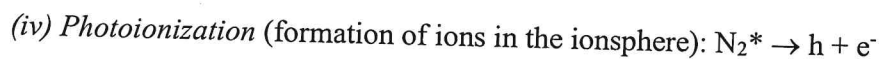
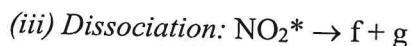
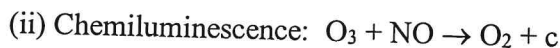
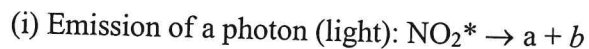
Answer all the Questions

TIME: 2 HOURS

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Question One (15 marks)

1. a). You are guided by some of the most important reaction processes in the atmosphere. Complete the following Chemical and Photochemical Reactions in the Atmosphere. Use the symbol* where necessary to show excitation. (8 Marks)



- b). Name the three main Greenhouse Gases and briefly explain your choice (7 marks)

Question Two (15 marks)

2. a). This is a guided question on explanation of Hg Biotransformation and Toxicity. Explain briefly on the subject using the outlined environmental or toxicological processes. (8 marks)

i. Elemental Hg absorption into organisms

ii. Biotransformation: bacteria transform elemental Hg into organic forms; e.g.

iii. Toxicity:

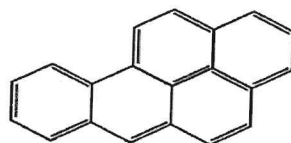
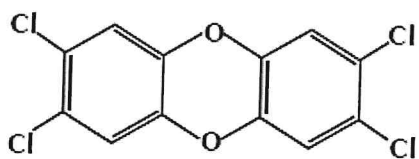
- b). How can asbestos be disposed off (2 marks)

- c). What is the chemical formula of asbestos? (2 marks)

- d). SO_2 is a pollutant of concern in the atmosphere. In a factory situation, briefly explain how you can remove SO_2 emission through a scrubber. (3 marks)

Question Three (15 Marks)

3. a). In what groups of organic pollutants does each of the structures below belong to? (4 marks)



- b). How does this compound come about in our environment? (2 marks)

- c). Sketch the structure of 2,3,7,8-tetrachloro-dibenzofuran (3 marks)

- d). What class of toxic chemicals is found in transformer liquid (oil)? (2 marks)

e). You are an environmental and toxicological chemistry researcher, and you are convinced that a certain chemical should be added on the list of banned chemicals in accordance to the Stockholm Convention MEA. Pick one of the chemicals you studied in SCH 850 class and give reasons why this chemical should be banned. The reasons should be of physical chemical characteristics of the chemical and its properties. (4 marks)

Question Four (16 marks)

4. a). Give the main features that an incinerator should have in order to help in disposal of hazardous waste. (5 marks)
- b). Briefly explain how you will dispose of 1000kg of perfluoro hexanesulfonate stockpile, without using thermal treatment methods. (5 marks)
- c). How will you treat or remediate soils that are contaminated PCBs? (2 marks)
- d). b. Where in Kenya do you think the government should install a chemical landfill? Give reasons for your answer (3 marks)

.....**60 Marks**.....