(CHEM 101)
First SEMESTER
MID-TERM EXAM
(1442 H) (2020-2021 G)



COLLEGE OF SCIENCE Chemistry Department

الاسم:	Write your answer in the table below						
	Q1:	Q6:	Q11:	Q16:			
الرقم الجامعي:	Q2:	Q7:	Q12:	Q17:			
رقم الشعبة:	Q3:	Q8:	Q13:	Q18:			
Monday 16/03/1442 H 07:00-09:00 PM	Q4:	Q9:	Q14:	Q19:			
Time allowed: 120 minutes	Q5:	Q10:	Q15:	Q20:			

IA																	VIIIA
1																	2
H	2											13	14	15	16	17	He
1.008	IIA											IIIA	IVA	VA	VIA	VIIA	4.003
3	4	1										5	6	7	8	9	10
Li	Ве											В	С	N	0	F	Ne
6.94	9.01											10.811	12.01	14.01	16.00	19.00	20.18
11	12	İ										13	14	15	16	17	18
Na	Mg	3	4	5	6	7	8	9	10	11	12	Al	Si	Р	S	CI	Ar
23.00	24.31	IIIB	IVB	VB	VIB	VIIB		VIIIB		IB	IIB	26.98	28.09	30.97	32.07	35.45	39.98
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	_	_	1						l					_	_	_	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
K 39.09	Ca	Sc 44.96	Ti 47.87	V 50.94	Cr 52.00	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.69	Cu 63.546	Zn 65.41	Ga 69.72	Ge 72.64	As 74.9216	Se 78.96	9.90	Kr 83.80
				_													1 1
39.09	40.08	44.96	47.87	50.94	52.00	54.94	55.85	58.93	58.69	63.546 47	65.41	69.72	72.64	74.9216	78.96	79.90	83.80
39.09	40.08	44.96 39	47.87 40	50.94 41	52.00 42	54.94 43	55.85 44	58.93 45	58.69 46	63.546	65.41 48	69.72 49	72.64 50	74.9216 51	78.96 52	79.90	83.80 54
39.09 37 Rb	40.08 38 Sr	39 Y	47.87 40 Zr	50.94 41 Nb	52.00 42 Mo	54.94 43 Tc	55.85 44 Ru	58.93 45 Rh	58.69 46 Pd	63.546 47 Ag	65.41 48 Cd	69.72 49 In	^{72.64} 50 Sn	74.9216 51 Sb	^{78.96} 52 Te	79.90 53	54 Xe
39.09 37 Rb 85.47	40.08 38 Sr 87.62	39 Y 88.91	47.87 40 Zr 91.23	50.94 41 Nb 92.91	52.00 42 Mo 95.94	54.94 43 TC [98]	55.85 44 Ru 101.07	58.93 45 Rh 102.91	58.69 46 Pd 106.42	63.546 47 Ag 107.87	65.41 48 Cd 112.41 80	69.72 49 In 114.82	72.64 50 Sn 118.71	74.9216 51 Sb 121.760	78.96 52 Te 127.60	79.90 53 I 126.90	54 Xe 131.29
39.09 37 Rb 85.47 55	40.08 38 Sr 87.62 56	44.96 39 Y 88.91 71	47.87 40 Zr 91.23 72	50.94 41 Nb 92.91 73	52.00 42 Mo 95.94 74	54.94 43 TC [98] 75	55.85 44 Ru 101.07 76	58.93 45 Rh 102.91 77	58.69 46 Pd 106.42 78	63.546 47 Ag 107.87 79	65.41 48 Cd 112.41	69.72 49 In 114.82 81	72.64 50 Sn 118.71 82	74.9216 51 Sb 121.760 83	78.96 52 Te 127.60 84	79.90 53 126.90 85	83.80 54 Xe 131.29 86
39.09 37 Rb 85.47 55 Cs	40.08 38 Sr 87.62 56 Ba	44.96 39 Y 88.91 71 Lu	47.87 40 Zr 91.23 72 Hf	50.94 41 Nb 92.91 73 Ta	52.00 42 Mo 95.94 74 W	54.94 43 Tc [98] 75 Re	55.85 44 Ru 101.07 76 Os	58.93 45 Rh 102.91 77 Ir	58.69 46 Pd 106.42 78 Pt	63.546 47 Ag 107.87 79 Au	65.41 48 Cd 112.41 80 Hg	69.72 49 In 114.82 81 TI	72.64 50 Sn 118.71 82 Pb	74.9216 51 Sb 121.760 83 Bi	78.96 52 Te 127.60 84 Po	79.90 53 126.90 85 At	83.80 54 Xe 131.29 86 Rn
39.09 37 Rb 85.47 55 Cs 132.91	40.08 38 Sr 87.62 56 Ba 137.33	44.96 39 Y 88.91 71 Lu 174.97	47.87 40 Zr 91.23 72 Hf 178.49	50.94 41 Nb 92.91 73 Ta 180.95	52.00 42 Mo 95.94 74 W 183.84	54.94 43 Tc [98] 75 Re 186.21	55.85 44 Ru 101.07 76 Os 190.23	58.93 45 Rh 102.91 77 Ir 192.22	58.69 46 Pd 106.42 78 Pt 195.08	63.546 47 Ag 107.87 79 Au 196.97	65.41 48 Cd 112.41 80 Hg 200.59	69.72 49 In 114.82 81 Tl 204.38	72.64 50 Sn 118.71 82 Pb	74.9216 51 Sb 121.760 83 Bi	78.96 52 Te 127.60 84 Po	79.90 53 126.90 85 At	83.80 54 Xe 131.29 86 Rn

Constant:

 $N_A \, (\textit{Avogadro's Number}) = 6.02 \; x \; 10^{23}$

- 1) How many mm³ equal one nm³?
- A) 10⁻⁶
- B) 10⁻¹²
- C) 10^{-3}
- D) 10⁻¹⁸
- 2) A piece of metal with a mass of 0.5 g has a volume of 0.142 cm³. What is the density (in g/cm³)?
- A) 3.1
- B) 2.9
- C) 3.5
- D) 3.8
- 3) A sample contains two substances and has uniform properties. The sample is:
- A) An element
- B) A compound
- C) a homogeneous mixture
- D) a heterogeneous mixture
- 4) How many neutrons and electrons are in the ²⁴Mg?
- A) 24 neutrons, and 24 electrons
- B) 12 neutrons, and 12 electrons
- C) 12 neutrons, and 24 electrons
- D) 24 neutrons, and 12 electrons
- 5) What is the name of $Fe_3(PO_4)_2$?
- A) Iron (II) phosphate
- B) Iron (III) phosphate
- C) Iron (II) phosphite
- D) Iron (III) phosphite
- 6) Which of the following is a polyatomic cation?
- A) Br
- B) K⁺
- C) NH₄⁺
- D) NO₃

- 7) What is the chemical formula for magnesium sulfate heptahydrate?
- A) MgSO₃.7H₂O
- B) MgSO₄.7H₂O
- C) $Mg_2SO_4.7H_2O$
- D) $Mg(SO_4)_2.7H_2O$
- 8) What is the atomic weight of an element consisting of two isotopes, one with mass = 64.23 amu (26.0%), and one with mass = 65.32 amu?
- A) 64.04
- B) 64.09
- C) 65.03
- D) 65.09
- 9) How many sub-shells are in n=3?
- A) 1
- B) 2
- C) 3
- D) 4
- 10) Which of the following electron configurations is correct for Fe?
- A) $[Ar]4s^23d^6$
- B) [Kr]4s¹3d⁶
- C) $[Ar]4s^13d^7$
- D) [Kr]4s¹4d⁷
- 11) Four electrons in an atom have the quantum number given below. Which electron is at the lowest energy?
- A) n = 4, l = 2, $m_l = -1$, $m_s = -\frac{1}{2}$
- B) n = 5, l = 1, $m_l = 0$, $m_s = +\frac{1}{2}$
- C) n = 5, l = 0, $m_l = 0$, $m_s = -\frac{1}{2}$
- D) n = 4, l = 0, $m_l = 0$, $m_s = +\frac{1}{2}$
- 12) What is the correct order for first ionization energies?
- A) Cl > S > Al > Ar > Si
- B) Ar > Cl > S > Si > Al
- C) Al > Si > S > Cl > Ar
- D) Cl > S > Al > Si > Ar

- 13) Which one of the following atoms has the largest radius?
- A) O
- B) F
- C) S
- D) Cl
- 14) Which is the group that has a ns²np⁵ electron configuration in their valence shell?
- A) 2A
- B) 5A
- C) 7A
- D) 7B
- 15) Which statement is **false** for the balanced equation given below?

$$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$$

- A) The reaction of 30 g of C₂H₆ will produce three moles of H₂O
- B) The reaction of 56 g of O₂ will produce 44 g of CO₂
- C) Two molecules of C_2H_6 requires seven molecules of O_2
- D) One mole of C₂H₆ will produce four moles of CO₂
- 16) Copper and sulfur react to form CuS. A 3.0 g sample of copper is reacted with 2.0 g of sulfur. Calculate unreacted mass of excess reactant.
- A) 0.96 g Cu
- B) 0.12 g S
- C) 0.52 g Cu
- $\frac{1}{0.49} = \frac{1}{2} = \frac{1}{2}$

- 17) A compound has the following percentage composition by mass: C = 55.6%, H = 4.38%, Cl = 30.8% and O = 9.26%. What is the empirical formula?
- A) C₁₆H₁₅Cl₃O₃
- B) C₁₅H₁₅Cl₃O₃
- C) C₂₀H₂₀Cl₂O₂
- D) $C_{16}H_{15}Cl_3O_2$
- 18) Which of the following contains the largest mass of carbon atoms?
- A) 1.1 moles C₄H₇F₃
- B) 1.5 moles C₃H₅N₃
- C) $3.0 \text{ moles } C_4H_8F_2$
- D) 3.5 moles C₃H₆F₂
- 19) A compound contains one nitrogen atom with a percent composition of 4.62%. What is the molecular weight of this compound?
- A) 300
- B) 308
- C) 312
- D) 303
- 20) A compound has the molecular formula $C_{13}H_6Cl_6O_2$ (molar mass = 407 g mol⁻¹). How many moles of chlorine atoms are in 5.0 g this compound?
- A) 0.012
- B) 0.073
- C) 0.360
- D) 0.460