

جامعة بيرزيت
BIRZEIT UNIVERSITY
Chemistry dept.
Chem 141

100
/ 100

Third Hour
~~Final Exam~~ Exam
Time : One hour

2nd sem.

جامعة بيرزيت

BIRZEIT UNIVERSITY

Instructor: Dr. Yacoub Zeiada

2017 2016

Name: Rami' Mohammad Amro Number: 1031160

Section: 1

GOOD LUCK

جَامِعَةُ بِيْرزَيْتِ

BIRZEIT UNIVERSITY

2017



2016

مَجْلِسُ الطَّلَبَةِ

8. Which is an impossible set of four quantum numbers for an electron in an atom?

- a. $n = 2, l = 1, m_l = 0, m_s = \frac{1}{2}$
 b. $n = 3, l = 0, m_l = 0, m_s = -\frac{1}{2}$
 c. $n = 5, l = 4, m_l = 3, m_s = \frac{1}{2}$
 d. $n = 1, l = 0, m_l = 0, m_s = -\frac{1}{2}$
 e. $n = 4, l = 2, m_l = -3, m_s = \frac{1}{2}$

9. Which of the following is NOT paramagnetic?

- a. Rb b. Cu c. Ca d. Te e. As

10. How many unpaired electrons are in the Co^{3+} ion?

- a. 2 b. 3 c. 4 d. 5 e. none

11. Which statement is incorrect about the Lewis structure for SeCl_3^{2+} ion

- a. There is one $\text{Se} \dots \text{Cl}$ double bond
 b. There is an octet of electrons around each of the chlorine atom
 c. There is a total of 26 valence electrons in the structure
 d. There is an octet of electrons around Se atom
 e. There is a lone pair of electrons in the valence shell of Se atom

12. How many resonance structures [that obey the octet rule] can be drawn for the molecule XO_3 , which contains 24 valence electrons?

- a. 1 b. 2 c. 5 d. 4 e. 3

13. What is the average $\text{Se}-\text{O}$ bond order in SeO_3 molecule?

- a. 2.00 b. 1.33 c. 1.00 d. 1.25 e. 2.33

14. What kind of hybrid orbitals are used by the central atom in a molecule of AsCl_3 ?

- a. sp^2 b. sp c. sp^3d d. sp^3d^2 e. sp^3

15. Which of the following molecules is nonpolar? [CENTRAL ATOM IS UNDERLINED]

- a. HCN b. SO₂ c. PCl₅ d. H₂S e. AsCl₃

1. Which one of the following elements has the smallest atoms?

- a. Sr b. Si c. Sn d. Se e. Sb

2. Which element is expected to be most chemically similar to phosphorous?

- a. S b. Se c. As d. Ga e. Si

3. Which one of the following bonds would be most polar?

- a. Ga - P
b. Ga - Si
 c. Ga - Cl
d. Ga - Br
e. Ga - As

4. Which one of the following elements has the highest ionization energy?

- a. O b. N c. C d. Cs e. Li

5. What is the correct electronic configuration of the V^{3+} ion?

- a. $1s^2 2s^2 2p^6 3s^2 3p^6 4d^2$
b. $1s^2 2s^2 2p^6 3s^2 3p^6 3s^2$
c. $1s^2 2s^2 2p^6 3s^2 3p^3 3d^3 4s^2$
 d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$
e. none of the above

6. The ground state of orbital diagram for the valence shell of Ge is:

- a. OX O O OX OX OX
b. OX O O O
 c. OX O O OX
d. O OX O O
e. OX OX OX OX OX O O O O

7. Which of the following has highest electron affinity?

- a. Cl b. F c. O d. I e. K

7

16. What angle exists between orbitals in sp^2 hybrid orbitals?

- a. 90.0° b. 120.0° c. 78.5° d. 109.5° e. 180.0°

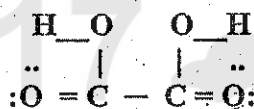
17. The ion $SeCl_3^+$ has a structure that would be described as.....

- a. T-shaped
 b. trigonal bipyramidal
 c. trigonal pyramidal
 d. planar triangular
 e. tetrahedral

18. What is the electron pairs arrangement [geometry] in the SbF_4^- ion?

- a. distorted tetrahedral
 b. tetrahedral
 c. hexahedral
 d. square planar
 e. trigonal bipyramidal

19. Consider the molecule...



This molecule contains....

- a. 4 sigma bonds and 5 pi bonds
 b. 9 sigma bonds and no pi bonds
 c. 7 sigma bonds and 2 pi bonds
 d. 5 sigma bonds and 4 pi bonds
 e. 5 sigma bonds and 2 pi bonds

20. Which statement below is NOT TRUE about pi bonds?

- a. They are formed by "sideways" overlap of p orbitals
 b. They cause rotation about the axis of a double bond to be very difficult
 c. They concentrate the electron density in regions above and below a plane that passes through both nuclei
 d. They are present in double and triple bonds
 e. Hybrid orbitals are used to form them



BirZeit University
Chemistry Department
Chemistry 141

3rd Hour Exam

Time: 80 min

1st Sem.

Instructors:

<i>Dr. Yacoub Ziadeh</i>	(sec. 1,4)
<i>Dr. Simon Kuttab</i>	(sec. 7)
<i>Dr. Sami Sayrafi</i>	(sec. 3, 6)
<i>Dr. Urayb Sayrafi</i>	(sec. 2,8)
<i>Dr. Mazen Hamed</i>	(sec. 5)

- Student Name: Wahid Mansour
- Student No: 101010101
- Section Number: 1

The exam contains 20 questions.

GOOD LUCK

:O:
:O: P :O:
:O:

5 * 24 + 3
32

1. All of the following are conjugate acid – base pairs except:
- a. H_3O^+ , OH^- b. NH_4^+ , NH_3
 c. HCO_3^- , CO_3^{2-} d. $\text{HC}_2\text{H}_3\text{O}_2$, $\text{C}_2\text{H}_3\text{O}_2^-$

2. The total number of valence electrons in the bromate ion (BrO_3^-) is:
- a. 25 b. 26 c. 27 d. 32 e. 20

V + 18 + 1

3. Within the phosphate ion PO_4^{3-} , the bonds would be:
- a. ionic and nonpolar b. ~~covalent and polar~~
 c. ~~covalent and nonpolar~~ d. triple bonds

4. In SF_4 , the electron pairs are arranged around the sulfur atom in:
- a. an octahedron b. square planar c. trigonal pyramidal d. tetrahedron
 e. trigonal bipyramidal

5. The Lewis structure of the SO_3 molecule is best represented as a resonance hybrid of _____ equivalent structures and the bond order is – respectively:
- a. 2, 1 b. 5, 1.66 c. 4, 1.25 d. 3, 1.33

6. In which of the following molecules the central atom does not obey the octet rule:
- a. OF_2 b. SF_4 c. PF_3 d. ClF

5 + 28

7. What is the shape of the NF_3 molecule:
- a. trigonal planar b. trigonal pyramidal
 c. tetrahedral d. trigonal bipyramidal

8. What hybrid orbitals are used in bonding by sulfur in SO_3^{2-} :
- a. sp^3d^2 b. sp c. sp^2 d. sp^3 e. none of these

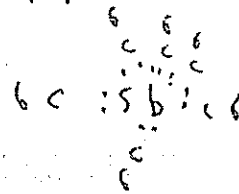
9. The central atom A in a molecule has sp^3d hybrid orbitals. If each hybrid orbital is used to bond an atom X to the central atom, then the molecule must have the formula.
- a. AX_2 b. AX_3 c. AX_4 d. AX_5 e. AX_6

10. Which of the following molecules is a polar molecule?
- a. BeCl_2 b. BF_3 c. CCl_4 d. SF_6 e. PCl_3

11. Which would be the most electronegative atom?
- a. P b. Sb c. Si d. Al e. Ga

8
s ↑↓ ↑↓ ↑↓ ↑↓

5 + 4 x 6 + 1



12. What is the shape of SbCl_6^- ion

- a. Tetrahedral
 c. Octahedral

- b. Trigonal bipyramidal
d. Planar

X 13. Based on electronegativity differences which ion pair of elements would form the most ionic bond:

- a. O and H ~~b. O and F~~ ~~c. S and Cs~~ d. S and Li e. Al and N

14. Which of the following diatomic molecules has the greatest bond strength:

- a. Cl_2 b. HCl c. CO d. H_2 e. HF

X 15. What is the formal charge on the chlorine atom in the chlorate ion ClO_3^- which is drawn showing three single bonds.

- a. +2 b. +1 c. 0 d. -1 e. -2

q X 16. The property which is a measure of the attraction of an atom for the electrons in a chemical bond is called.

- a. electron affinity ~~b. ionization energy~~
 c. electronegativity d. hybridization

17. In the Lewis structure for ClF_3 , the number of lone pairs (non bonded pairs) of electrons around the central atom is:

- c a. 0 b. 1 c. 2 d. 3 e. 4

18. The ion ICl_4^- is made from four chlorine atoms bonded to a central iodine atom. There are two lone pairs of electrons around the central iodine atom. What is the shape of this ion?

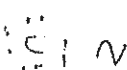
- a. square planar b. Tetrahedral
c. Octahedral d. Trigonal bipyramidal

19. Which of the following molecules is non polar

- a. ClF_3 b. PF_3 ~~c. BF_3~~ d. CH_2F_2 e. IF

20. How many pi bonds are there in the CN^- ion.

- a. 0 b. 1 c. 1.5 d. 2





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Periodic Chart of the Elements

IA	IIA	III	IVA	VA	VIA	VIIA	VIIIA	IB	IIB	IIIB	IVB	VB	VIB	VIB	VIB	VIB	VIB	VIB	MOBILE GASES
1 H 1.0079	2 He 4.00260																		
3 Li 6.941	4 Be 9.01218																		
11 Na 22.98977	12 Mg 24.305																		
19 K 39.0983	20 Ca 40.08	21 Sc 44.9559	22 Ti 47.88	23 V 50.9415	24 Cr 51.996	25 Mn 54.938	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.546	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80		
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9059	40 Zr 91.224	41 Nb 92.9064	42 Mo 95.94	43 Tc (97)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.4	47 Ag 107.8682	48 Cd 112.411	49 In 114.818	50 Sn 118.710	51 Sb 121.757	52 Te 127.60	53 I 126.905	54 Xe 131.30		
55 Cs 132.9054	56 Ba 137.33	57 La 138.9055	58 Ce 140.12	59 Pr 140.9077	60 Nd 144.242	61 Pm (147)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.9254	66 Dy 162.50	67 Ho 164.9304	68 Er 167.259	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.967			
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)															

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The International Union for Pure and Applied Chemistry (IUPAC) has adopted the following symbols for the elements:
* These symbols are derived from the Latin names of the elements.
* These symbols are derived from the Latin names of the elements.
* These symbols are derived from the Latin names of the elements.

Atomic weights are given in parentheses for elements of unknown or uncertain atomic weight.
Data in this chart have been checked by the National Bureau of Standards Office of Standard Reference Data.
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58 Ce 140.12	59 Pr 140.9077	60 Nd 144.242	61 Pm (147)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.9254	66 Dy 162.50	67 Ho 164.9304	68 Er 167.259	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.967
90 Th (232)	91 Pa (231)	92 U (238)	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (254)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

**BIRZEIT UNIVERSITY
CHEMISTRY DEPARTMENT
CHEM 131**

**3rd HOUR EXAM
TIME: 75 MIN.**

13
20

~~1ST SEM~~

**INSTRUCTORS: DR. YACOUB ZIADEH
DR. HANI AWAD
DR. SIMON KUTTAB
DR. ZAKI HASSAN**

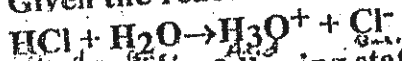
STUDENT NAME Muhammad Nassar
STUDENT NUMBER _____

SECTION:

1	2	3	4	5	6	7	8	9
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GOOD LUCK

1- Given the reaction:



Which of the following statements is INCORRECT.

- (a) Cl^- is the conjugate base of HCl ✓
- (b) H_3O^+ is the conjugate acid of H_2O ✓
- (c) H_2O is a stronger base than Cl^- ✓
- (d) HCl molecule is a Lewis acid ✓
- (e) H^+ is the Lewis acid ✓

2- Which of the following species is an amphiprotic or amphoteric substance.

- (a) HF
- (b) H_2O ✓
- (c) HCl
- (d) NH_4^+
- (e) None of the above

3- The correct order of the strength of the following binary acids is

- (a) $\text{NH}_3 < \text{HF} < \text{HCl} < \text{H}_2\text{O}$
- (b) $\text{H}_2\text{O} < \text{HF} < \text{NH}_3 < \text{HCl}$ ✓
- (c) $\text{NH}_3 < \text{H}_2\text{O} < \text{HF} < \text{HCl}$ ✓
- (d) $\text{HCl} < \text{HF} < \text{H}_2\text{O} < \text{NH}_3$
- (e) $\text{HF} < \text{NH}_3 < \text{H}_2\text{O} < \text{HCl}$

4- The correct order of the strength of the following OXOACIDS is

- (a) $\text{HClO}_4 > \text{H}_2\text{CO}_3 > \text{H}_2\text{SO}_4 > \text{H}_3\text{PO}_4$
- (b) $\text{H}_2\text{CO}_3 > \text{H}_3\text{PO}_4 > \text{HClO}_4 > \text{H}_2\text{SO}_4$
- (c) $\text{HClO}_4 > \text{H}_2\text{SO}_4 > \text{H}_3\text{PO}_4 > \text{H}_2\text{CO}_3$ ✓
- (d) $\text{H}_3\text{PO}_4 > \text{H}_2\text{SO}_4 > \text{HClO}_4 > \text{H}_2\text{CO}_3$
- (e) $\text{H}_2\text{SO}_4 > \text{HClO}_4 > \text{H}_3\text{PO}_4 > \text{H}_2\text{CO}_3$

5- Which of the following species has a coordinate covalent bond.

- (a) NH_4^+
- (b) NH_3BF_3 ✓
- (c) $\text{Al}(\text{H}_2\text{O})_6^{+3}$
- (d) $\text{Cu}(\text{H}_2\text{O})_4^{2+}$
- (e) All of the above

6- HBr is a stronger binary acid than HCl because:

- (a) H-Br bond is more polar than H-Cl bond
- (b) H-Br bond is stronger than H-Cl bond
- (c) H-Cl bond is more polar than H-Br bond
- (d) H-Cl bond is stronger than H-Br bond ✓
- (e) None of the above

7- Which of the following molecular is nonpolar

- (a) CHCl_3
- (b) PCl_3
- (c) SO_2
- (d) H_2O
- (e) BCl_3 ✓

8- The formal charge on the nitrogen atom in HNO_3 is:

- (a) 1^+
- (b) 1^-
- (c) 2^+ ✓
- (d) 2^-
- (e) 3^+



BirZeit University
Chemistry Department
Chemistry 131


3rd hr. Exam
Time: 1 hr

1st Semester

Instructor: Dr. Simon Kuttab (sec. 2,6)
Dr. Jack Mustaklem (sec. 5)
Dr. Sami Sayrafi (sec. 1,7)
Dr. Zaki Abdel Majed (sec. 4)

- Student Name: Abdulrahman Sharakh
- Student No: 1020186
- Section Number & Instructor: 6 Simon Kuttab

The exam contains 18 questions.

& GOOD LUCK 

9- The bond order in the most stable lewis structure for the sulfate ion SO_4^{2-} is :

4 structures

(a) 1

(b) 1.5

(c) 2

(d) 0.5

(e) 1.33

10- In H_2O and NH_3 molecules the H-X-H bond angles are 104.5° and 107° respectively. The magnitude of the deviation of these angles from those of a tetrahedron is due to the difference in the:

(a) size of the central atoms (O and N)

(b) electronegativity of the central atoms

(c) Number of lone-pair electrons present in the hybrid orbitals of the central atoms

(e) all the above

11- Choose the compound with the most ionic bond.

a) LiCl

(b) KF

c) NaCl

d) LiF

e) KCl

12- As the number of bonds between two carbon atoms increases, which one of the following DECREASES?

a) number of electrons between the carbon atoms

b) bond energy

d) vibrational frequency

(c) bond length

e) none of these

13- Which of the following is a valid Lewis structure for O_3 ?

(a) $\text{:O}=\text{O}::\text{O:}$

b) $\text{:O}-\text{O}-\text{O:}$

c) $\text{:O}=\text{O}-\text{O:}$

(d) $\text{:O}-\text{O}=\text{O:}$

e) $\text{:O}-\text{O}=\text{O:}$

14- The hybridization of I in IF_4^- is

a) sp

b) sp^2

c) $sp^2 d$

d) $sp^3 d$

(e) $sp^3 d^2$

15- What would be the hybridization of sulfur in the following compounds, respectively?

SO_4^{2-}

SF_6

SO_2

a) $sp^3 d^2, sp^2, sp^2$

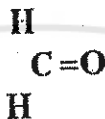
(b) $sp^3, sp^3 d^2, sp^2$

c) $sp^3, sp^3 d, sp^2$

d) $sp^3, sp^3 d, sp^2$

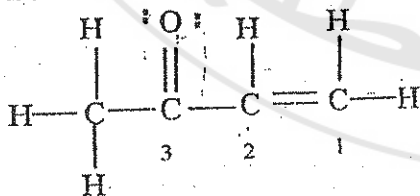
e) $sp, sp^3 d^2, sp^2$

- 16- The bond angles about the carbon atom in the formaldehyde molecule are about:



- a) 120° b) 60° c) 109° d) 180° e) 90°
- 17- What type of structure does the XeOF₂ molecule have?
- a) pyramidal b) tetrahedral c) T-shaped
d) triangular e) octahedral
- 18- Which of the following species has a trigonal bipyramidal structure?
- a) NH₃ b) IF₅ c) I₃⁻ d) PCl₅ e) none of these
- 19- Which of the following statements is/are CORRECT?
- The hybridization of boron in BF₃ is sp².
 - The molecule XeF₄ is nonpolar.
 - The bond order of N₂ is three.
 - The molecule HCN has two pi bonds and two sigma bonds.
- a) all four statements are correct b) 2 is correct
c) 1 and 4 are correct d) 2 and 3 are correct
e) 2, 3, and 4 are correct

- 20- Consider this Lewis structure:



- 21- Which statement about the molecule is false?

- a) There are 10 sigma and 2 pi bonds.
b) C-2 is sp² hybridized with bond angles of 120°.
c) Oxygen is sp hybridized.
d) This molecule contains 28 valence electrons.
e) There are some H - C - H bond angles of about 109° in the molecule.

Circle the best possible answer:

1. Which of the following atoms has three unpaired electrons.
A (a) N b. O c. Al d. S e. Mg

2. As the number of bonds between two atoms increases, which of the following decreases?
a. Number of electrons between atoms b. Bond energy
c. Bond length d. Bond order
e. Vibrational frequency

3. From the following species (ions and an atom) choose the one with the smallest radius (smallest size).
a. Ca^{+2} b. K^+ c. Ar d. Cl^- e. S^{2-}

4. The stable ionic compound formed by the reaction of scandium ($Z = 21$) and Fluorine is:
a. ScF b. ScF_2 c. ScF_3 d. ScF_4 e. ScF_5

5. In the compound PF_5 , the electron pairs around the phosphorous atom are:

- (a) Five bonding pairs and no lone pairs
b. Four bonding pairs and one lone pair
c. Three bonding pairs and two lone pairs
d. Five bonding pairs and one lone pair
e. Five bonding pairs and two lone pairs

6. Choose the electron dot formula which most accurately describes the bonding in CS_2 (Hint: consider formal charges).

- (a) $:\ddot{\text{S}} = \text{C} = \ddot{\text{S}}:$ b. $:\ddot{\text{C}} = \text{S} = \ddot{\text{S}}:$ c. $:\ddot{\text{S}} - \text{C} - \ddot{\text{S}}:$
d. $:\ddot{\text{S}} - \text{C} = \ddot{\text{S}}:$ e. $:\ddot{\text{S}} - \text{C} \equiv \text{S}:$

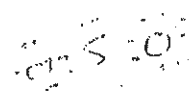
7. Select the incorrect set of four quantum numbers:

- | | n | l | ml | ms |
|----|---|---|----|------|
| a. | 1 | 0 | 0 | +1/2 |
| b. | 4 | 2 | -1 | -1/2 |
| c. | 5 | 4 | -2 | +1/2 |
| d. | 5 | 0 | 2 | -1/2 |

8. The energy released when an electron is added to a neutral atom in the gas phase is its:

- (a) Electron affinity b. First ionization energy
c. Second ionization energy d. Third ionization energy

- 11 12 13 16
9. Select the element with the largest electronegativity
 a. S b. As c. P (d) Cl e. Br
10. List these bonds in order of increasing bond polarity: (the least polar first and the most polar last)
 a. NiS < SiO < KCl (b) SiO < NiS < KCl
 c. NiS < KCl < SiO d. KCl < NiS < SiO
11. Which of the following can have three resonance structures:
 a. SO₂ b. CO₂ (c) NO₃⁻ d. PF₃
12. How many electrons can be contained in all of the orbitals with n = 4
(a) 2 b. 8 c. 10 d. 18 (e) 32
13. The ground state electron configuration of this element is [Ar] 4s²3d³.
 The element is:
 a. Calcium b. Scandium c. Chromium
 d. titanium (e) Vanadium
14. The bond order of the sulfur oxygen bond in a sulfur dioxide molecule is:
 a. 0.5 b. 1.0 (c) 1.5 (d) 2.0 c. none of these
15. Select the element with the greatest electron affinity:
(a) Fluorine (b) Chlorine c. Bromine d. Iodine
16. Select the ionic compound with the greatest lattice energy
 a. LiCl b. NaCl c. KCl (d) CaO
17. The total number of valence shell electrons in the NO⁺ ion is
 a. 6 b. 8 (c) 10 d. 12 e. 14
18. Which of the following is a pseudonoble gas configuration:
 a. 1s²2s²2p⁶3s²3p⁶ b. 1s²2s²2p⁶3s²3p⁶3d¹⁰
 c. 1s²2s²2p³ (d) 1s²2s²2p⁶3s²3p⁶3d¹⁰4s²





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Periodic Chart of the Elements

IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA	IB	IIB	IIIB	IVB	VB	VIB	VII B	VIII B	NOBLE GASES	
1 H 1.0079	2 He 4.00260	3 Li 6.941	4 Be 9.01218	5 B 10.81	6 C 12.011	7 N 14.0067	8 O 15.9994	9 F 18.998403	10 Ne 20.179	11 Na 22.98977	12 Mg 24.305	13 Al 26.98154	14 Si 28.0855	15 P 30.97376	16 S 32.06	17 Cl 35.453	18 Ar 39.948
19 K 39.0983	20 Ca 40.08	21 Sc 44.9559	22 Ti 47.88	23 V 50.9414	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.70	29 Cu 63.546	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9058	40 Zr 91.22	41 Nb 92.9064	42 Mo 95.94	43 Tc (97)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.4	47 Ag 107.868	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.9045	54 Xe 131.30
55 Cs 132.9054	56 Ba 137.33	57 La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.85	75 Re 186.207	76 Os 190.2	77 Ir 192.22	78 Pt 195.09	79 Au 196.9665	80 Hg 200.59	81 Tl 204.37	82 Pb 207.2	83 Bi 208.9804	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226.0254)	89 Ac (227)	104 Rf (260)	105 Db (260)													

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The International Union for Pure and Applied Chemistry has not adopted official names or symbols for these elements.
* These weights are considered reliable to ± 1 in the last space.

Atomic weights corrected to carbon 12 = 12.0000. Values of the Commission on Atomic Weights. Data in this chart have been checked by the National Bureau of Standards' Office of Standard Reference Data.
* COPV (1977)
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Ann Arbor, Michigan

1 Melting

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
140.12	140.9077	144.24	(145)(147)	150.4	151.96	157.25	158.9254	162.50	164.9304	167.26	168.9342	173.04	174.97

90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
232.0381	231.0369	238.029	(237)(248)(249)	(244)	(243)	(247)	(247)	(251)	(254)	(257)	(258)	(259)	(260)

BIRZEIT UNIVERSITY
CHEMISTRY DEPARTMENT
CHEM. 141

3rd HOUR EXAM
TIME: 70 MINUTES

STUDENT'S NAME:.....

STUDENT'S ID:.....

INSTRUCTOR'S NAME:

- Discussion:**
- Dr. Mazen Hamed** (1, 3)
 - Dr. Imad Qamhieh** (2, 6)
 - Dr. Zaki Hassan** (4)
 - Dr. Yacoub Zaideh** (5)
 - Dr. Hani Awad** (7)
 - Dr. Oraib Al Sayrafi** (8)

14/19

BIRZEIT UNIVERSITY

question	a	b	c	d	e
1	✓		✓		
2	✓				
3			✓		✓
4					✓
5		✓			
6				✓	
7			✓	✓	
8		✓			
9					✓
10		✓			
11					✓
12	✓				
13		✓			
14			✓		
15	✓				
16			✓		
17	✓				
18					✓
19				✓	✓
20	✓				

1. How many lone (unshared) pairs are there in the Lewis structure of ClF_3 ?

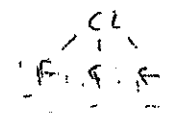
~~a. 3~~

b. 10

c. 11

d. 8

e. 7



2. Which of the following pairs of atoms are least likely to form an ionic compound?

a. Li, Mg

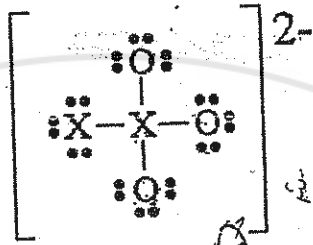
b. Na, F

c. Cu, Cl

d. Ni, O

e. Li, F

3. What is atom X in the Lewis structure of the following dianion?



a. Xe

b. Cl

c. C

d. N

e. S

4. How many non-bonding electrons are located on the central atom of ICl_4^- ?

a. 2

b. 1

c. 0

d. 6

e. 4

5. The formal charge on the Xe atom in OXeF_4 is: [Xe is the central atom]

a. -2

b. +1

c. 0

d. -1

e. +2

6. The molecules NF_3 , BF_3 , and ClF_3 have similar molecular formulas but different molecular geometries. Use VSEPR to predict their molecular shapes.

- a. NF_3 T-shaped; BF_3 trigonal planar; ClF_3 trigonal pyramidal
 b. NF_3 trigonal planar; BF_3 T-shaped; ClF_3 trigonal pyramidal
 c. NF_3 T-shaped; BF_3 trigonal pyramidal; ClF_3 trigonal planar
d. NF_3 trigonal pyramidal; BF_3 trigonal planar; ClF_3 T-shaped
 e. NF_3 trigonal pyramidal; BF_3 T-shaped; ClF_3 trigonal planar

7. What is the kind of the hybrid orbitals AND the molecular shape of the XeF_4 molecule?

a. sp^3 , tetrahedral
b. sp^3d^2 , square planar

c. sp^2 , planar triangular

d. sp^3d^2 , square pyramidal
 e. sp^3d , trigonal bipyramidal

8. Which is the strongest of the following oxoacids?

a. HBrO_3

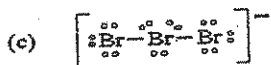
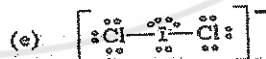
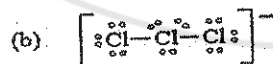
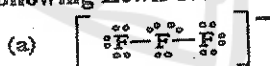
b. HIO_3

c. HNO_2

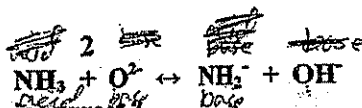
d. H_2SO_3

e. HClO_3

9. Which of the following Lewis structures is NOT acceptable?



10. Consider the following reaction:



Which of the following statements is correct?

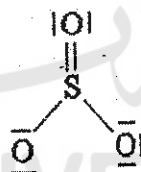
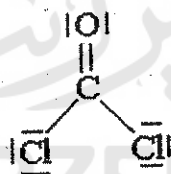
- a. O^{2-} is the conjugate acid of OH^-
- b. OH^- is the conjugate acid of O^{2-}
- c. NH_2^- is the conjugate acid of NH_3
- d. NH_3 is the conjugate base of NH_2^-
- e. all the above

11. How many σ bonds and π bonds are in HCN molecule?



- a. one σ bond and three π bonds
- b. two σ bonds and one π bond
- c. one π bond and three σ bonds
- d. four σ bonds
- e. two σ bonds and two π bond

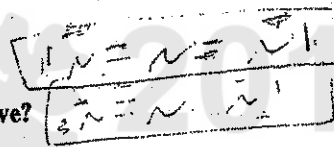
12. The molecular geometry of both COCl_2 and SO_3 is trigonal planar (triangular planar)



Which one of the following statements is true?

- a. Both COCl_2 and SO_3 are non-polar
- b. SO_3 is non-polar whereas COCl_2 is polar
- c. Both COCl_2 and SO_3 are polar
- d. COCl_2 is non-polar whereas SO_3 is polar
- e. None of the above

13. How many resonance structures does N_3^- have?



- a. 3
- b. 2
- c. 1
- d. 4
- e. none of the above

14. When the molecules H_2O , CH_4 , and NH_3 are arranged in order of increasing bond angle, the correct sequence is:

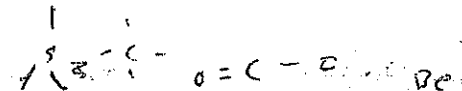
- a. H_2O , CH_4 , NH_3
- b. NH_3 , H_2O , CH_4
- c. H_2O , NH_3 , CH_4
- d. CH_4 , NH_3 , H_2O
- e. CH_4 , H_2O , NH_3

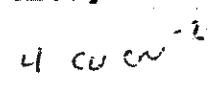
15. The shape of ICl_4^- is:

- a. square planar.
- b. see saw.
- c. octahedral.
- d. tetrahedral.
- e. square pyramidal.

16. When the binary acids HI , HCl , HF and H_2O are arranged in order of increasing strength the correct sequence is:

- a. $\text{HF} < \text{H}_2\text{O} < \text{HCl} < \text{HI}$
- b. $\text{HI} < \text{H}_2\text{O} < \text{HF} < \text{HCl}$
- c. $\text{H}_2\text{O} < \text{HF} < \text{HCl} < \text{HI}$
- d. $\text{HI} < \text{H}_2\text{O} < \text{HCl} < \text{HF}$
- e. $\text{HI} < \text{HCl} < \text{HF} < \text{H}_2\text{O}$

17. Which of the following molecule is polar? 
 (a) POCl₃ [p is central atom] b. SO₃ c. CH₄ d. CO₂ e. BeCl₂

18. the formula of the complex ion formed by Cu²⁺ ion and 4 CN⁻ ions is: 
 a. CuCN₄ b. Cu(CN)₄ c. Cu(CN)₄²⁻ d. Cu(CN)₄⁴⁻ (e) none of the above

19. In the reaction : $\text{HCl} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{Cl}^-$
acid base acid base

- a. according to Lewis the above reaction is the displacement of the weaker base Cl⁻ by the stronger base H₂O
- b. HCl is a Lewis acid because it donates a proton (H⁺) to the base H₂O
- c. HCl is the Brønsted-Lowry because it donates a proton(H⁺) to the base H₂O
- (d) both a and c are correct
- e. both b and c are correct

20. Using the following activity series, which of the following reactions will take place?

Metal	Oxidation Reaction
Li	Li → Li ⁺ + e ⁻
Na	Na → Na ⁺ + e ⁻
Cr	Cr → Cr ³⁺ + 3e ⁻
Ni	Ni → Ni ²⁺ + 2e ⁻
H ₂	2H ₂ → 2H ⁺ + 2e ⁻
Cu	Cu → Cu ²⁺ + 2e ⁻
Ag	Ag → Ag ⁺ + e ⁻
Au	Au → Au ³⁺ + 3e ⁻

↑
Ease of oxidation increases

- a. 2Na + 2H⁺ → 2Na⁺ + H₂
- b. Cu + 2H⁺ → Cu²⁺ + H₂
- c. Ni²⁺ + Cu → Ni + Cu²⁺
- (d) 3Ag⁺ + Au → 3Ag + Au³⁺
- e. Cr³⁺ + 3Ag → Cr + 3Ag⁺



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Periodic Chart of the Elements

IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA	IB	IIB	IIIB	IVB	VB	VIB	VIB	VIB	NOBLE GASES											
1 H 1.0079	2 He 4.00260							1 H 1.0079	2 He 4.00260																		
3 Li 6.941	4 Be 9.01218							9 F 18.998403	10 Ne 20.179																		
11 Na 22.98977	12 Mg 24.305							7 N 14.0067	8 O 15.9994	15 P 30.973761	16 S 32.06	17 Cl 35.453	18 Ar 39.948														
19 K 39.0983	20 Ca 40.08	21 Sc 44.9559	22 Ti 47.88	23 V 50.9415	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847	27 Co 58.9332	28 Ni 58.71	29 Cu 63.546	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.9216	34 Se 78.96	35 Br 79.904	36 Kr 83.80										
37 Rb 85.4678	38 Sr 87.62	39 Y 88.9058	40 Zr 91.22	41 Nb 92.9064	42 Mo 95.94	43 Tc (97)	44 Ru 101.07	45 Rh 102.9055	46 Pd 106.4	47 Ag 107.868	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.9045	54 Xe 131.30										
55 Cs 132.9054	56 Ba 137.33	57 La 138.9055	72 Hf 178.49	73 Ta 180.9479	74 W 183.85	75 Re 186.207	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.9665	80 Hg 200.59	81 Tl 204.37	82 Pb 207.2	83 Bi 208.9804	84 Po (209)	85 At (210)	86 Rn (222)										
87 Fr (223)	88 Ra 226.0254	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (285)	111 Rg (289)	112 Cn (285)	113 Nh (284)	114 Fl (289)	115 Mc (288)	116 Lv (293)	117 Ts (294)	118 Og (294)										
58 Ce 140.12	59 Pr 140.9077	60 Nd 144.24	61 Pm (145)	62 Sm 150.4	63 Eu 151.96	64 Gd 157.25	65 Tb 158.9254	66 Dy 162.50	67 Ho 164.9304	68 Er 167.26	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.97	90 Th 232.0381	91 Pa 231.0359	92 U 238.029	93 Np 237.0482	94 Pu 244	95 Am 243	96 Cm 247	97 Bk 247	98 Cf (251)	99 Es (254)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

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 * Atomic weights are considered reliable to 0.1 in the last place. Other weights are reliable to 1 in the last place.
 † Atomic weights corrected to conform to the 1963 values of the Commission on Atomic Weights.
 ‡ Data in this chart have been checked by the National Bureau of Standards' Office of Standard Reference Data.
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21/21
Excellent

Birzeit University
Chemistry Department
Chemistry 141

Third Hour Exam

1st Sem. 2012-2013

Time: 80 min.

● Student Name: Rahel Rimawi

● Student No: 1120125

● Instructor Name: Dr. Hijazi Abu Ali

● Section No: Pharm.D

Important note: There are (21) equally graded questions, please answer all of them.

E	D	C	B	A	Q
X					1
				X	2
	X				3
X					4
X			X		5
			X		6
		X			7
			X		8
		X			9
	X				10
			X		11
	X				12
		X			13
		X			14
		X			15
	X			X	16
			X		17
			X		18
X			X		19
	X				20
	X				21

GOOD LUCK

1. What is the charge on the monatomic ion of nitrogen, the nitride ion?

- A) +2 B) +1 C) -1 D) -2 E) -3

2. Consider the element with the electron configuration $[\text{Kr}]5s^24d^{10}5p^5$. This element is

- A) a representative element D) an actinide element
B) a transition metal E) a noble gas
C) an alkali metal

3. Which two electron configurations represent elements that would have similar chemical properties?

- (1) $1s^22s^22p^4$ (2) $1s^22s^22p^5$ (3) $[\text{Ar}]4s^23d^5$ (4) $[\text{Ar}]4s^23d^{10}4p^3$

- A) (1) and (2) B) (1) and (3) C) (2) and (3) D) (2) and (4) E) (3) and (4)

4. Which one of the following is not *isoelectronic* with the others: Br^- , Rb^+ , Se^{2-} , Sr^{2+} , Te^{2-} ?

- A) Br^- B) Rb^+ C) Se^{2-} D) Sr^{2+} E) Te^{2-}

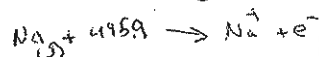
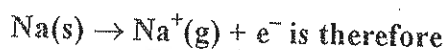
5. Which one of the following does *not* have $[\text{Kr}]$ as its electronic configuration?

- A) Se^{2-} B) Br^- C) Rb^+ D) Y^{3+} E) Zn^{2+}

6. The lattice energy of MgBr_2 is the energy change for which one, if any, of the following processes?

- A) $\text{MgBr}_2(\text{g}) \rightarrow \text{Mg}^{2+}(\text{s}) + 2\text{Br}^-(\text{g})$ D) $\text{MgBr}_2(\text{aq}) \rightarrow \text{MgBr}_2(\text{s})$
 B) $\text{MgBr}_2(\text{s}) \rightarrow \text{Mg}^{2+}(\text{g}) + 2\text{Br}^-(\text{g})$ E) $\text{MgBr}_2(\text{g}) \rightarrow \text{MgBr}_2(\text{s})$
C) $\text{MgBr}_2(\text{s}) \rightarrow \text{Mg}(\text{g}) + 2\text{Br}(\text{g})$

7. The first ionization energy of sodium is 495.9 kJ/mol. The energy change for the reaction



- A) 495.9 kJ/mol. B) less than 495.9 kJ/mol.
 C) greater than 495.9 kJ/mol. D) is equal to the electron affinity of sodium.
E) is equal to the second ionization energy of sodium.

8. The successive ionization energies of a certain element are $I_1 = 577.9$ kJ/mol, $I_2 = 1820$ kJ/mol, $I_3 = 2750$ kJ/mol, $I_4 = 11,600$ kJ/mol, and $I_5 = 14,800$ kJ/mol. This pattern of ionization energies suggests that the unknown element is

- A) K B) Al C) Cl D) Se E) Kr

Student Name: _____

Student No: _____

9. If the radius of atom X is greater than the radius of atom Y, then it is also likely that

- A) X has a larger electron affinity than Y does.
- B) X has a larger effective nuclear charge than Y does.
- C) X has greater metallic character than Y does*
- D) X has a larger first ionization energy than Y does.
- E) X is a poorer conductor of electricity than Y when in the solid state.

10. Which one of the following is most likely to be a covalent compound?

- A) Rb_2O
- B) BaO
- C) SrO
- D) SeO_2
- E) MnO_2

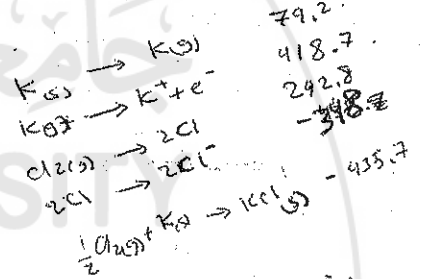
11. The Lewis dot symbol for the chloride ion is

- A) $:\ddot{Cl}:$
- B) $:\ddot{Cl}:^-$
- C) $:Cl^-$
- D) $:\ddot{Cl}:^-$
- E) Cl^-

* 12. Use the following data to calculate the lattice energy of $KCl(s)$ given the following data:

- $\Delta H(\text{sublimation}) K = 79.2 \text{ kJ/mol}$
- $IE_1(K) = 418.7 \text{ kJ/mol}$
- Bond energy ($Cl-Cl$) = 242.8 kJ/mol
- $EA(Cl) = -348 \text{ kJ/mol}$
- $\Delta H_f^\circ(KCl(s)) = -435.7 \text{ kJ/mol}$

- A) -165 kJ/mol
- B) 288 kJ/mol
- C) 629 kJ/mol
- D) 707 kJ/mol
- E) 828 kJ/mol



13. The number of lone electron pairs in the NO_2^- ion is ____.

- A) 4
- B) 5
- C) 6
- D) 7
- E) 8

14. The number of resonance structures for the sulfur dioxide molecule that satisfy the octet rule is

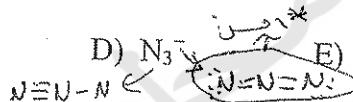
- A) 1
- B) 2
- C) 3
- D) 4
- E) None of these

15. What is the formal charge on the oxygen atom in N_2O (the atomic order is $N-N-O$)?

- A) 0
- B) +1
- C) -1
- D) -2
- E) +2

16. For which of these species does the best Lewis structure have two or more equivalent resonance structures?

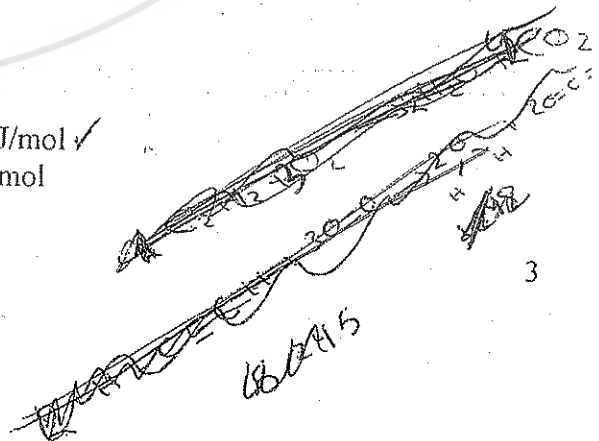
- A) HCO_2^-
- B) SCN^-
- C) CNO^-
- D) N_3^-
- E) CO_2



* 17. Estimate the enthalpy change for the combustion of one mole of acetylene, C_2H_2 , to form carbon dioxide and water vapor.

- $BE(C-H) = 456 \text{ kJ/mol}$
- $BE(C=O) = 802 \text{ kJ/mol}$
- $BE(O=O) = 499 \text{ kJ/mol}$
- $BE(C \equiv C) = 962 \text{ kJ/mol}$
- $BE(O-H) = 462 \text{ kJ/mol}$

- A) -1759 kJ/mol
- B) $+653 \text{ kJ/mol}$
- C) $+1010 \text{ kJ/mol}$
- D) -1010 kJ/mol ✓
- E) -155 kJ/mol



● Student Name: _____

● Student No: _____

18. Give the number of lone pairs around the central atom and the molecular shape of the ion PCl_4^- .

- A) 0 lone pairs, tetrahedral
- B) 1 lone pair, distorted tetrahedron (seesaw)
- C) 1 lone pair, square pyramidal
- D) 1 lone pair, tetrahedral
- E) 2 lone pairs, square planar

19. The electron group shape of the SF_4 molecule is

- A) tetrahedral. *bipyramidal*
- B) distorted trigonal pyramidal.
- C) trigonal planar.
- D) square planar.
- E) distorted tetrahedron (seesaw)

20. Which of the following substances is/are bent in its molecular shape?

- (i) H_2S (ii) CO_2 (iii) ClNO (iv) NH_2^- (v) O_3

- A) only (iii)
- B) only (i) and (v)
- C) only (i), (iii), and (v)
- D) all are bent except for (iv)
- E) all are bent except for (ii)

21. The C-N-O bond angle in nitromethane, CH_3NO_2 , is expected to be approximately

- A) 60°
- B) 90°
- C) 109.5°
- D) 120°
- E) 180°

2017



2016

مجلس الطلبة



Fisher Scientific Company

Periodic Chart of the Elements

IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA	IB	IIB	IIIB	IVB	VB	VIB	VIB, GASES	VIB, GASES	VIB, GASES	
1 H 1.0079	2 He 4.00260	3 Li 6.941 ¹	4 Be 9.01218	5 B 10.81	6 C 12.011	7 N 14.0067	8 O 15.9994 ¹	9 F 18.998403	10 Ne 20.179	11 Na 22.98977	12 Mg 24.305	13 Al 26.98154	14 Si 28.0855	15 P 30.97376	16 S 32.06	17 Cl 35.453	18 Ar 39.948 ¹
19 K 39.0983 ¹	20 Ca 40.08	21 Sc 44.9559	22 Ti 47.88	23 V 50.9414 ¹	24 Cr 51.996	25 Mn 54.9380	26 Fe 55.847 ¹	27 Co 58.9332	28 Ni 58.70	29 Cu 63.546 ¹	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59 ¹	33 As 74.9216	34 Se 78.96 ¹	35 Br 79.904	36 Kr 83.80
37 Rb 85.4678 ¹	38 Sr 87.62	39 Y 88.9058	40 Zr 91.22	41 Nb 92.9064 ¹	42 Mo 95.94	43 Tc (97)	44 Ru 101.07 ¹	45 Rh 102.9055	46 Pd 106.4	47 Ag 107.868	48 Cd 112.41	49 In 114.82	50 Sn 118.69 ¹	51 Sb 121.75 ¹	52 Te 127.60 ¹	53 I 126.9045	54 Xe 131.30
55 Cs 132.9054	56 Ba 137.33	57 La 138.9055 ¹	72 Hf 178.49 ¹	73 Ta 180.9479 ¹	74 W 183.85 ¹	75 Re 186.207	76 Os 190.2	77 Ir 192.22 ¹	78 Pt 195.09 ¹	79 Au 196.9665	80 Hg 200.59 ¹	81 Tl 204.37 ¹	82 Pb 207.2	83 Bi 208.9804 ¹	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226.0254)	89 Ac (227)	104 δ (260)	105 δ (260)	106 δ (260)	107 δ (260)	108 δ (260)	109 δ (260)	110 δ (260)	111 δ (260)	112 δ (260)	113 δ (260)	114 δ (260)	115 δ (260)	116 δ (260)	117 δ (260)	118 δ (260)

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CAT NO S-702-10
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¹ These weights are computed relative to ¹²C in the last place. Other weights are relative to ¹⁶O in the last place.

Atomic weights corrected to conform to the 1976 values of the Commission on Atomic Weights. Data in this chart have been checked by the National Bureau of Standards Office of Standard Reference Data.

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58 Ce 140.12	59 Pr 140.9077	60 Nd 144.241	61 Pm (145)	62 Sm 150.4	63 Eu 151.96	64 Gd 157.25	65 Tb 158.9254	66 Dy 162.50	67 Ho 164.9304	68 Er 167.26	69 Tm 168.9342	70 Yb 173.04	71 Lu 174.97
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90 Th 232.0381	91 Pa 231.0359	92 U 238.0289	93 Np (237.0482)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (254)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)
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BirZeit University
Chemistry Department
Chemistry 141

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excellent
Ja
Saja
~~Fuad~~

3rd Hour Exam
Time: 70 min.

1st Sem. 2013/2014

جامعة بيرزيت

Instructor: Dr. Hani Awad

2017 2016

Student Name: Saja Fuad

Student No: 1130749

مجلس الطلبة

GOOD LUCK ✍

1) A proton is roughly 1800 times more massive than an electron. If a proton and an electron are traveling at the same speed, (E)

- A) the wavelength of the photon will be about 1800 times longer than the wavelength of the electron.
- B) the wavelength of the photon will be about $\sqrt{1800}$ times longer than the wavelength of the electron.
- C) the wavelength of the photon will be roughly equal to the wavelength of the electron.
- D) the wavelength of the electron will be about $\sqrt{1800}$ times longer than the wavelength of the photon.
- E) the wavelength of the electron will be about 1800 times longer than the wavelength of the photon.

2) Which of the following is a correct set of quantum numbers for an electron in a 3d orbital? (D)

- A) $n = 3, l = 0, m_l = -1$
- B) $n = 3, l = 3, m_l = +2$
- C) $n = 3, l = 1, m_l = +3$
- D) $n = 3, l = 2, m_l = -2$
- E) $n = 3, l = 2, m_l = 3$

3) What is the name given to the statement "The most stable arrangement of electrons in orbitals of equal energy is the one in which the number of electrons with the same spin is maximized"? (E)

- A) The Pauli exclusion principle
- B) de Broglie's relation
- C) Bohr's equation
- D) Dalton's atomic theory
- E) Hund's rule

4) In the electron configuration $[\text{Ar}]4s^2 3d^{10} 4p^4$, which are valence electrons? (E)

- A) all of the electrons after the [Ar]
- B) only the $4s^2$ electrons
- C) only the $3d^{10}$ electrons
- D) only the $4p^4$ electrons
- E) both the $4s^2$ and the $4p^4$ electrons

5) The ions below do not follow the octet rule, with the exception of (D)

- A) Fe^{3+}
- B) Sn^{2+}
- C) Ni^{2+}
- D) Tl^{4+}
- E) Cr^{3+}

6) The orientation in space of an atomic orbital is associated with (C)

- A) the principal quantum number.
- B) the angular momentum quantum number.
- C) the magnetic quantum number.
- D) the spin quantum number.
- E) None of these choices is correct.

7) Elements with _____ first ionization energies and _____ electron affinities generally form cations. (B)

- A) low, very negative
 B) low, positive or slightly negative
 C) high, very negative
 D) high, positive or slightly negative
 E) None of these is generally correct.

8) The energy level of the 1s orbital in H, 1s orbital in He and the 1s orbital in Li. (C)

- A) All have the same energy.
 B) The 1s in Li is higher in energy than 1s in H.
 C) The 1s in H is higher in energy than 1s in Li.
 D) The 1s in Li is higher in energy than 1s in He.
 E) All statements are incorrect.

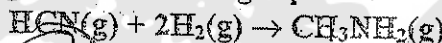
9) Which of the single bond have the highest percent ionic character? (B)

- A) C-H
 B) O-H
 C) O-N
 D) N-H
 E) O-C

10) Given the following table of bond enthalpies:

bond	bond enthalpy (kJ/mol)
C-H	413
C-C	348
C-N	293
N-H	391
H-H	436
N-N	163
O-H	463
C=C	614
C-N (triple bond)	891

Calculate the ΔH for the following reaction in the gas phase:



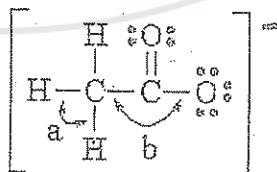
- A) -736 kJ
 B) -551 kJ
 C) -138 kJ
 D) +230 kJ
 E) +275 kJ

11) Which statement is FALSE?

- A) If an electron has quantum number $n = 3$, the electron could be in a d sublevel.
 B) If an electron has quantum number $l = 2$, the only possible values of m_l are 0 and 1.
 C) If an electron has $m_l = -1$, it might be in a p, d, or f sublevel but not in an s sublevel.
 D) An electron that has $n = 3$ cannot be in an f sublevel.
 E) An electron that has $n = 5$ could be in an s, p, d, or f sublevel.

12) What are the approximate values of the bond angles, a and b, in the ion illustrated below? (C)

- A) a is $\sim 90^\circ$ and b is $\sim 90^\circ$
 B) a is $\sim 109^\circ$ and b is $\sim 109^\circ$
 C) a is $\sim 109^\circ$ and b is $\sim 120^\circ$
 D) a is $\sim 120^\circ$ and b is $\sim 109^\circ$
 E) a is $\sim 90^\circ$ and b is $\sim 180^\circ$



13) Give the number of lone pairs around the central atom and the molecular geometry of IF_5 . (D)

- A) 0 lone pairs, square pyramidal
B) 0 lone pairs, trigonal bipyramidal
C) 1 lone pair, octahedral
D) 1 lone pair, square pyramidal
E) 2 lone pairs, pentagonal

14) Select the compound with the highest lattice energy. (E)

- A) $\text{CaS}(s)$
B) $\text{BaO}(s)$
C) $\text{NaI}(s)$
D) $\text{LiBr}(s)$
E) $\text{MgO}(s)$

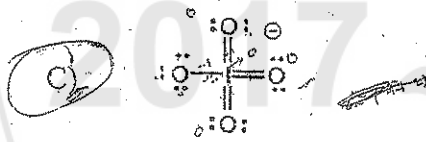
15) The hybrid orbitals for the P-C bond in F_2PCN are (C)

- A) $\text{P}(sp^3)\text{-C}(sp^2)$
B) $\text{P}(sp^2)\text{-C}(sp)$
C) $\text{P}(sp^3)\text{-C}(sp)$
D) $\text{P}(sp^2)\text{-C}(sp^2)$
E) none of the above

16) Which of the following is not polar?

- A) N_2O
B) NF_3
C) H_2Se
D) FeO_3
E) CH_3Cl (D)

17) Select the best Lewis structure for the periodate anion, IO_4^- . (C)



18) Arrange aluminum, nitrogen, phosphorus and indium in order of increasing electronegativity. (C)

- A) $\text{Al} < \text{In} < \text{N} < \text{P}$
B) $\text{Al} < \text{In} < \text{P} < \text{N}$
C) $\text{In} < \text{Al} < \text{P} < \text{N}$
D) $\text{In} < \text{P} < \text{Al} < \text{N}$
E) None of these choices is correct.

19) Which scientist demonstrated that photons transferred momentum during collisions with matter? (D)

- A) Bohr
B) de Broglie
C) Planck
D) Compton
E) Billiard

20) Which of the following elements has the largest second ionization energy (IE_2)? (A)

- A) Li
B) B
C) O
D) F
E) Na

PERIODIC TABLE OF THE ELEMENTS

<http://www.periodni.com>

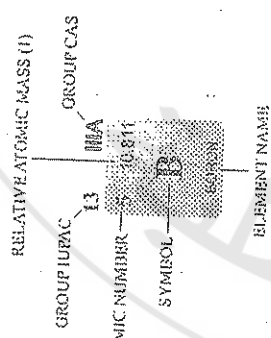
GROUP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H 1.0079 HYDROGEN																	2 He 4.0026 HELIUM
2	3 Li 6.941 LITHIUM	4 Be 9.0122 BERYLLIUM											5 B 10.811 BORON	6 C 12.011 CARBON	7 N 14.007 NITROGEN	8 O 15.999 OXYGEN	9 F 18.998 FLUORINE	10 Ne 20.180 NEON
3	11 Na 22.990 SODIUM	12 Mg 24.305 MAGNESIUM											13 Al 26.982 ALUMINUM	14 Si 28.086 SILICON	15 P 30.974 PHOSPHORUS	16 S 32.065 SULPHUR	17 Cl 35.453 CHLORINE	18 Ar 39.948 ARGON
4	19 K 39.098 POTASSIUM	20 Ca 40.078 CALCIUM	21 Sc 44.956 SCANDIUM	22 Ti 47.867 TITANIUM	23 V 50.942 VANADIUM	24 Cr 51.996 CHROMIUM	25 Mn 54.938 MANGANESE	26 Fe 55.845 IRON	27 Co 58.933 COBALT	28 Ni 58.693 NICKEL	29 Cu 63.546 COPPER	30 Zn 65.38 ZINC	31 Ga 69.723 GALLIUM	32 Ge 72.64 GERMANIUM	33 As 74.922 ARSENIC	34 Se 78.96 SELENIUM	35 Br 79.904 BROMINE	36 Kr 83.798 KRYPTON
5	37 Rb 85.468 RUBIDIUM	38 Sr 87.62 STRONTIUM	39 Y 88.906 YTIORIUM	40 Zr 91.224 ZIRCONIUM	41 Nb 92.906 NIOBIUM	42 Mo 95.96 MOLYBDENUM	43 Tc 98 TECHNETIUM	44 Ru 101.07 RUDELIUM	45 Rh 102.91 RHODIUM	46 Pd 106.42 PALLADIUM	47 Ag 107.87 SILVER	48 Cd 112.41 CADMIUM	49 In 114.82 INDIUM	50 Sn 118.71 TIN	51 Sb 121.76 ANTIMONY	52 Te 127.60 TELLURUM	53 I 126.90 IODINE	54 Xe 131.29 XENON
6	55 Cs 132.91 CAESIUM	56 Ba 137.33 BARIUM	57 La-Lu 57-71 LANTHANIDE	58 Ce 137.91 CELESIUM	59 Pr 138.91 PRASEODYMIUM	60 Nd 140.91 NEODYMIUM	61 Pm 140.91 PROMETHIUM	62 Sm 150.36 SAMARIUM	63 Eu 151.96 EUROPEUM	64 Gd 157.25 GADOLINIUM	65 Tb 158.93 TERBIUM	66 Dy 162.50 DYSPROSIUM	67 Ho 164.93 HOLMIUM	68 Er 167.26 ERBIUM	69 Tm 168.93 THULIUM	70 Yb 173.05 YTERBIUM	71 Lu 174.97 LUTETIUM	
7	87 Fr 223 FRANCIUM	88 Ra 226 RADIUM	89 Ac 227 ACTINIUM	90 Th 232.04 THORIUM	91 Pa 231.04 PACTINIUM	92 U 238.03 URANIUM	93 Np 237 NEPTUNIUM	94 Pu 244 PLUTONIUM	95 Am 243 AMERICIUM	96 Cm 247 CURIUM	97 Bk 247 BERKELIUM	98 Cf 251 CALIFORNIUM	99 Es 252 EINSTEINIUM	100 Fm 257 FERMIUM	101 Md 258 Mendelevium	102 No 259 Nobelium	103 Lr 262 Lawrencium	

Legend for element classification:

- Metal
- Semimetal
- Nonmetal
- Alkali metal
- Alkaline earth metal
- Transition metals
- Lanthanide
- Actinide
- Chalcogens element
- Halogens element
- Noble gas

STANDARD STATE (25 °C; 101 kPa)

- Ne - gas
- Fe - solid
- Tc - synthetic
- Br - liquid
- At - synthetic



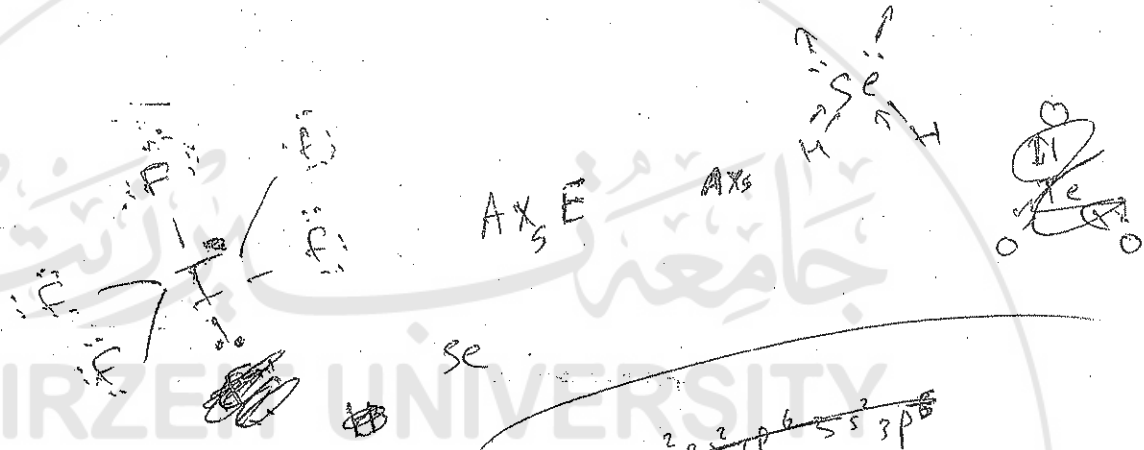
(1) Pure Appl. Chem., 81, No. 11, 2131-2159 (2009)
 Relative atomic masses are expressed with five significant figures. For elements that have no stable nuclides, the value enclosed in brackets indicates the mass number of the longest-lived isotope of the element. However, three such elements (Tl, Po and U) do have a characteristic terrestrial isotopic composition, and for these an atomic weight is tabulated.

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~~3 H₂O = 7~~

mass proton ≈ 1800 mass e⁻

$c = 3 \times 10^8$



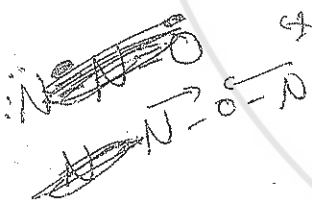
5s	5p	5d	5f	5g
4s	4p	4d	4f	
3s	3p	3d		
2s	2p			
1s				

53

1s ²	2s ²	2p ⁶	3s ²	3p ⁶	4s ²	4p ⁶	5s ²
4d¹⁰ 5p⁶							

AX₃E₂

IF₅

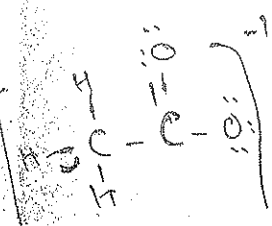


+3

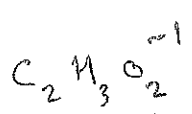
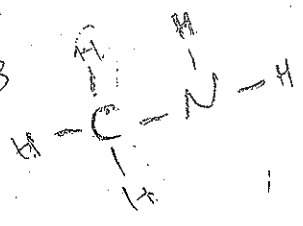
1s ²	2s ²	2p ⁶	3s ²	3p ⁶	4s ²	3d ³
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1 H-C	413
1 C≡N	293
2 H-H	2(436)
<hr/>	
2176	

3 H-C	3(413)
1 C≡N	293
2 N-H	2(30)
<hr/>	
2314	



1 H-C	413
1 C=O	293
2 H-H	



AX₄ CMC 12

AX₃

AX₃ 1436

1s ²	2s ²	2p ⁶
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AX₄

جَامِعَةُ بِيْرزَيْتِ

BIRZEIT UNIVERSITY

2017



2016

مَجْلَسُ الطَّلَبَةِ