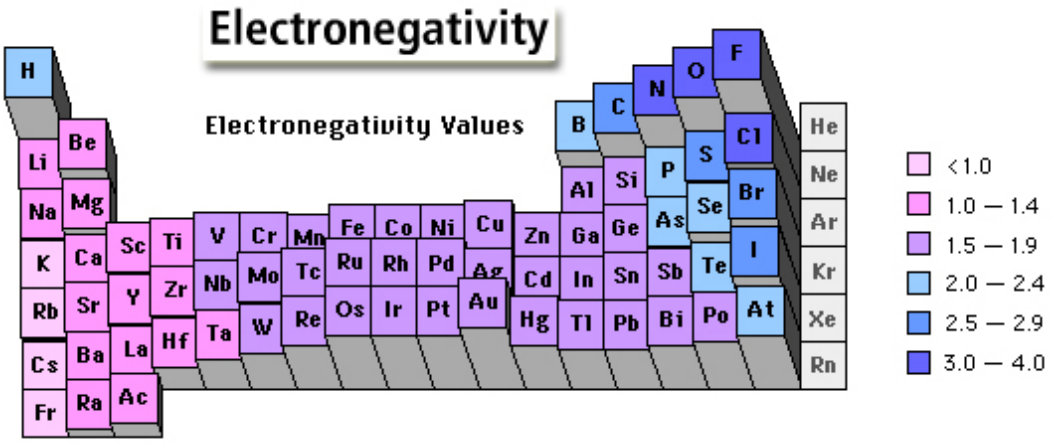
The Periodic Table

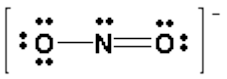
IA												IIIA	IVA	VA	VIA	VIIA	VIIIA
H 1 1.01	IIA																He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 18 39.95
K 19 39.10	Ca 20 40.08	Sc 21 44.96	Ti 22 47.88	V 23 50.94	Cr 24 52.00	Mn 25 54.94	Fe 26 55.85	Co 27 58.93	Ni 28 58.69	Cu 29 63.55	Zn 30 65.39	Ga 31 69.72	Ge 32 72.61	As 33 74.92	Se 34 78.96	Br 35 79.90	Kr 36 83.80
Rb 37 85.47	Sr 38 87.62	Y 39 88.91	Zr 40 91.22	Nb 41 92.91	Mo 42 95.94	Tc 43 (97.9)	Ru 44 101.07	Rh 45 102.91	Pd 46 106.42	Ag 47 107.87	Cd 48 112.41	In 49 114.82	Sn 50 118.71	Sb 51 121.76	Te 52 127.60	I 53 126.90	Xe 54 131.29
Cs 55 132.91	Ba 56 137.33	La 57 138.91	Hf 72 178.49	Ta 73 180.95	W 74 183.85	Re 75 186.21	Os 76 190.2	Ir 77 192.22	Pt 78 195.08	Au 79 197.97	Hg 80 200.59	Tl 81 204.38	Pb 82 207.2	Bi 83 208.98	Po 84 (209)	At 85 (210)	Rn 86 (222)
Fr 87 223.02	Ra 88 226.03	Ac 89 227.03	Rf 104 (261)	Db 105 (262)	Sg 106 263)	Bh 107 (262)	Hs 108 (265)	Mt 109 (266)	Ds 110 (271)	Rg 111 (272)	Uub 112 (285)	Uut 113 (284)	Uuq 114 (289)	Uup 115 (288)			

Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08	Fm 100 257.10	Md 101 (257)	No 102 259.10	Lr 103 262.11



SID | | | | | | | | | Last _____ First _____

Question 1 (6 Points)



The following questions pertain to the Lewis Dot structure depicted on the left

a) With respect to the **central nitrogen atom**:

i. The number of **lone pairs**: _____

ii. The number of **single bonds**: _____

iii. The number of **double bonds**: _____

b) How many equivalent **Lewis Structures** does the nitrite ion have? _____

Question 2 (12 Points)

Draw a Lewis structure for each of the following where the central atom obeys the **octet rule**.

N_2	**NCl_3 (Cl = Chlorine)**
NOF	**CN^-**

Question 3 (12 Points)

Draw a **Lewis structure** for each of the following **organic molecules** on the left. Then use your diagram to answer the questions on the right.

CH_3CH_2COOH (6 Points)	***Count double bonds as 2 bonds for this structure only.*** a) The **number** of **C-H bonds** _____ b) The **number** of **C-C bonds** _____ c) The **number** of **C-O bonds** _____
C_2H_4 (6 Points)	a) The **number** of **C-H bonds** _____ b) The **number** of **C-C single bonds** _____ c) The **number** of **C=C double bonds** _____

Question 4 (6 Points)

a) **Name** of the compound with the formula **N_2O**? _____

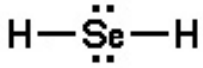
b) **Name** of the compound with the formula **SO_2**? _____

c) **Formula** for **dinitrogen tetraoxide**? _____

Question 5
4 Points

Draw all **resonance structures** for HCO_2^-:

Question 6
6 Points



The following questions pertain to the Lewis Structure of SeH_2 depicted on the left:

a) The **electron-pair geometry** around **Se** is: _____

b) The **molecular geometry** around **Se** is: _____

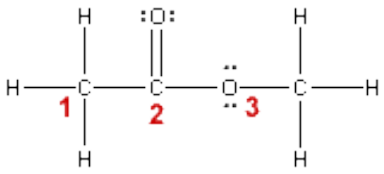
Question 7
6 Points

a) What is the **electron-pair geometry** about **N** in $NICl_2$: _____

b) What is the **molecular geometry** about **N** in $NICl_2$: _____

Note:- **(Cl = Chlorine)**

Question 8
6 Points



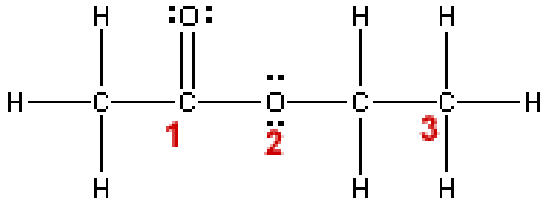
What is the **molecular geometry** about:

a) **Atom 1**: _____

b) **Atom 2**: _____

c) **Atom 3**: _____

Question 9
6 Points



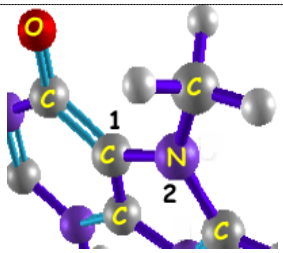
The **predicted bond angle** about:

a) **Atom 1**: _____

b) **Atom 2**: _____

c) **Atom 3**: _____

Question 10
4 Points



What is the **predicted bond angle** about the following atoms?

a) **Carbon 1** _____

b) **Nitrogen 2** _____

Question 11
6 Points

Label the following molecules as **polar** or **nonpolar**. (The central atom is given first in the formula)

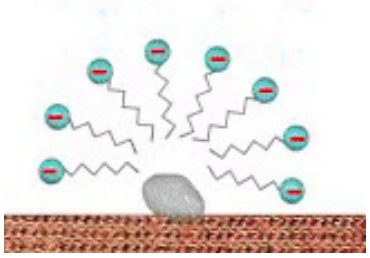
a) **NOCl** (Cl = Chlorine) _____

b) N_2 _____

c) SCl_2 (Cl = Chlorine) _____

Question 12 (4 Points)

In our discussion on the **consequences of molecular polarity**, the cartoon shown below was used to discuss:



a) Membranes
b) Micelle action
c) Fabric softeners
d) Like dissolves like
e) Detergents

Question 13 (4 Points)

Write the **equilibrium constant expression**, K, for the following reactions:

a) $F^- + H_2O\ (l) \rightleftharpoons HF\ (aq) + OH^-$ K= _____

b) $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$ K= _____

Question 14 (4 Points)

For the following equilibrium system, **K = 4.50x10^{10}** at 298K.

$$HNO_2(aq) + OH^- \rightleftharpoons NO_2^- + H_2O(l)$$

Assuming that you start with **equal concentrations** of **HNO_2** and **OH^-**, and **that no NO_2^- is initially present**, which of the following best describes the equilibrium system?

a) The **reverse** reaction is favored at equilibrium.
b) **Very little HNO_2** will be present at equilibrium
c) **Appreciable** quantities of **all species** are present at equilibrium.
d) The **forward** reaction is favored at equilibrium.

Question 15 (6 Points)

Consider the following system at equilibrium at 723 K

$$2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g)$$

When some $NH_3(g)$ is **removed** from the equilibrium system at 723K

The **reaction must**:

a) Run in the forward direction
b) Run in the reverse direction
c) Remain the same

The **concentration of H_2** will

a) Increase
b) Decrease
c) Remain the same

Question 16 (8 Points)

Consider the following system at equilibrium at 298K:

$$HCN(aq) + H_2O(l) \rightleftharpoons H_3O^+ + CN^-$$

The production of **CN^-** is favored by:

Indicate **True (T) or False (F)** for each of the following:

a) **Addition** of **HCN**. _____
b) **Addition** of **H_3O^+**. _____
c) **Removing CN^-**. _____
d) **Addition** of **OH^-**. _____

Do Not Write Below This

Exam II Score