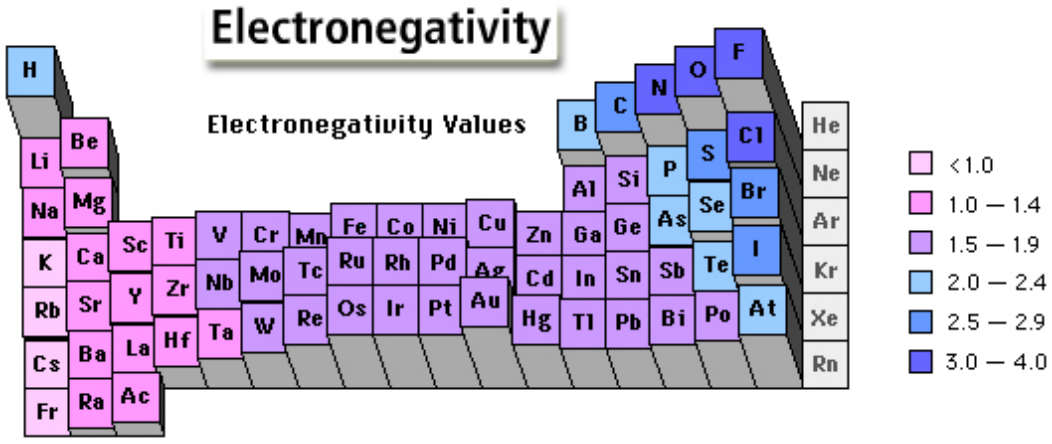
The Periodic Table

IA																	VIIIA
H 1 1.01	IIA											IIIA	IVA	VA	VIA	VIIA	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)			

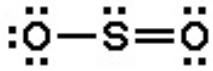
Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99 252.08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



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

Question 1 (3 Points)

To answer the questions, interpret the following Lewis diagram for SO_2



a) The number of **single** bond _____

b) The number of **double** bond _____

c) The number of **equivalent Lewis** structures _____

Question 2 (8 Points)

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

CN^-

F_2CO

ClO_3^-

NH_3

Question 3 (6 Points)

On the rough work paper provided – draw a Lewis structure for **CO_2** in which the central *C* atom obeys the octet rule, and answer the questions on the right based on your drawing.

a) The number of **unshared pairs** (**lone pairs**) on the central *C* atom is: _____

b) The central *C* atom forms _____ **single** bonds.

c) The central *C* atom forms _____ **double** bonds.

Question 4 (8 Points)

Draw a Lewis structure for each of the following **organic molecules**.

$CH_3OCH_2CH_3$

HCOOH

CH_3CONH_2

C_3H_6

Question 5
6 Points

NO_2Cl has resonance structures – draw them. **Cl = Chlorine**

Question 6
8 Points

What is the **name** of the compound with the formula:

a) **NF_3** _____

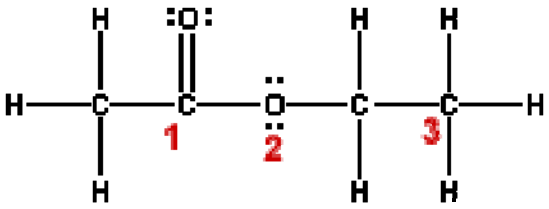
b) **P_4O_{10}** _____

What is the **formula** for:

a) **sulfur hexafluoride** _____

b) **Nitrogen monoxide** _____

Question 7
6 Points



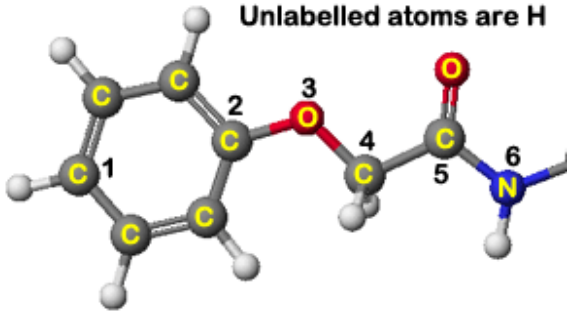
What is the bond angle about:

a) **1**: _____

b) **2**: _____

c) **3**: _____

Question 8
6 Points



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

C2 _____

O3 _____

N6 _____

Question 9
4 Points

$HNO_2(aq) + OH^-(aq) \Leftrightarrow NO_2^-(aq) + H_2O(l)$ K = **4.50×10^{10}** at 298K.

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

a) The **forward** reaction is favored at equilibrium.

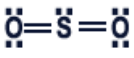
b) **Appreciable** quantities of **all species** are present at equilibrium.

c) The **reverse** reaction is favored at equilibrium.

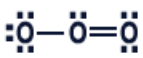
d) Very little **OH^-** will be present at equilibrium.

e) The **concentration** of **NO_2^-** will be approximately equal to the **HNO_2** **concentration** at equilibrium.

Question 10
8 Points



A



B

C

The following questions relate to the Lewis Structures depicted above

a) **The molecule** with the **smallest** bond angle: _____

b) The **molecular geometry** of **B**: _____

c) The **Electron Pair Geometry** of ***C***: _____

d) The **molecule(s)** that is(are) expected to be **polar**: _____

Question 11
6 Points

The **electron-pair geometry** around the **N** atom in **NOCl**? _____ – There is/are _____ **lone pair(s)** around the central atom, so the **molecular geometry** of the **NOCl** molecule is predicted to be _____.

Question 12
4 Points

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

a) $2\ NOBr(g) \Leftrightarrow 2\ NO(g) + Br_2(g)$ K = _____

b) $HCN(aq) + H_2O(l) \Leftrightarrow H_3O^+(aq) + CN^-(aq)$ K = _____

Question 13
6 Points

Consider the following system at equilibrium at 698 K:

$$\mathbf{2\ HI(g) \Leftrightarrow H_2(g) + I_2(g)}$$

When some $\mathbf{I_2(g)}$ is **removed** from the equilibrium system at constant temperature:

The reaction must:

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

The concentration of $\mathbf{H_2}$ will:

a) **Increase**
b) Remain the **same**
c) **Decrease**

Question 14
6 Points

Consider the following system at equilibrium at 298 K:

$$\mathbf{H_3O^+(aq) + NO_2^-(aq) \Leftrightarrow HNO_2(aq) + H_2O(l)}$$

When some $\mathbf{OH^-}$ is **added** to the equilibrium system at constant temperature:

The reaction must:

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

The concentration of $\mathbf{HNO_2}$ will:

a) **Increase**
b) Remain the **same**
c) **Decrease**

Question 15
6 Points

Consider the following system at equilibrium at 573 K:

$$2\ NO(g) + Cl_2(g) \Leftrightarrow 2\ NOCl(g) + 18.4\ kcal$$

If the **temperature** of the equilibrium system is suddenly **decreased**:

The reaction must:

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

The concentration of Cl_2 will:

a) **Increase**
b) Remain the **same**
c) **Decrease**

Question 16
6 Points

Consider the following system at equilibrium at 675K:

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

If the **volume** of the equilibrium system is suddenly **increased**:

The reaction must:

d) Run in the **forward** direction.
e) Run in the **reverse** direction.
f) Remain the **same**.

The concentration of NH_3 will:

d) **Increase**
e) Remain the **same**
f) **Decrease**

Question 17
3 Points

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

a) Fabric softeners
b) Membranes
c) Detergents
d) Like dissolves like
e) Lead poisoning

Exam II Score