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

Electronegativity

Electronegativity Values

Electronegativity table with elements colored by value:

Color	Value
	< 1.0
	1.0 — 1.4
	1.5 — 1.9
	2.0 — 2.4
	2.5 — 2.9
	3.0 — 4.0

Question 1
8 Points

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

a) The number of **lone pair** on central atom   _____

$:\ddot{O}-\ddot{S}=\ddot{O}$

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

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

d) 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.

Question 6
8 Points

What is the **name** of the compound with the formula:
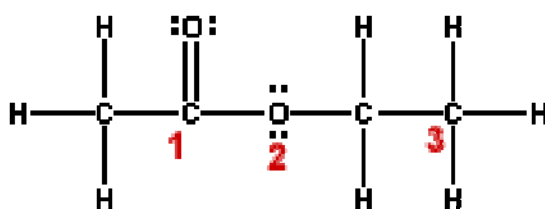
a) NF_3 _____

b) P_4O_{10} _____

What is the **formula** for:

a) sulfur hexafluoride _____

b) Nitrogen monoxide _____
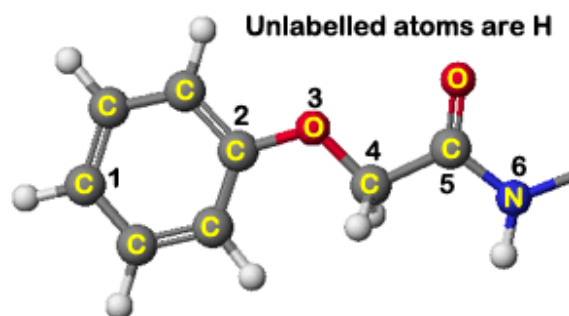
Question 7
6 Points

What is the bond angle about:

a) **1**: _____

b) **2**: _____

c) **3**: _____

Question 8
6 Points

Unlabelled atoms are H

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

C2 _____

O3 _____

N6 _____

Question 9
4 Points

$HNO_2(aq) + OH^-(aq) \Leftrightarrow NO_2^-(aq) + H_2O(l)$ $K = 4.50 \times 10^{10}$ 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.
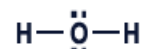
Question 10
8 Points

$$\ddot{O}=\ddot{S}=\ddot{O} \qquad\qquad :\ddot{O}-\ddot{O}=\ddot{O} \qquad\qquad H-\ddot{O}-H$$
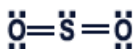
$$\text{A} \qquad\qquad\qquad\qquad \text{B} \qquad\qquad\qquad\qquad \text{C}$$

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

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

Question 13
6 Points

Consider the following system at equilibrium at 698 K:

$$2\ HI(g) \Leftrightarrow H_2(g) + I_2(g)$$

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

The reaction must: $\qquad\qquad\qquad\qquad$ The concentration of H_2 will:

a) Run in the **forward** direction. $\qquad\qquad$ a) **Increase**

b) Run in the **reverse** direction. $\qquad\qquad$ b) Remain the **same**

c) Remain the **same**. $\qquad\qquad\qquad$ c) **Decrease**

Question 14
6 Points

Consider the following system at equilibrium at 298 K:

$$H_3O^+(aq) + NO_2^-(aq) \Leftrightarrow HNO_2(aq) + H_2O(l)$$
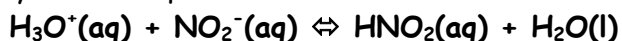
When some OH^- is **added** to the equilibrium system at constant temperature:

The reaction must: $\qquad\qquad\qquad\qquad$ The concentration of HNO_2 will:

a) Run in the **forward** direction. $\qquad\qquad$ a) **Increase**

b) Run in the **reverse** direction. $\qquad\qquad$ b) Remain the **same**

c) Remain the **same**. $\qquad\qquad\qquad$ c) **Decrease**

Question 15
6 Points

Consider the following system at equilibrium at 573 K:

$$2 \text{ NO(g)} + \text{Cl}_2\text{(g)} \Leftrightarrow 2 \text{ NOCl(g)} + 18.4 \text{ kcal}$$
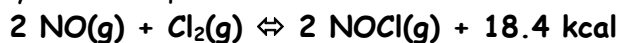
If the **temperature** of the equilibrium system is suddenly **decreased**:

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
4 Points

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

a) Fabric softeners

b) Micelle actions

c) Membranes

d) The dissolution process

e) Detergents

f) EDTA use in salad dressings

g) Lead poisoning

h) Chelating therapy.

Exam II Score