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)			

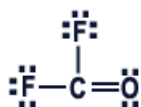| Ce 58 140.12	Pr 59 140.91	Nd 60 144.24	Pm 61 (145)	Sm 62 150.36	Eu 63 152.97	Gd 64 157.25	Tb 65 158.93	Dy 66 162.50	Ho 67 164.93	Er 68 167.26	Tm 69 168.93	Yb 70 173.04	Lu 71 174.97
Th 90 232.04	Pa 91 231.04	U 92 238.03	Np 93 237.05	Pu 94 (240)	Am 95 243.06	Cm 96 (247)	Bk 97 (248)	Cf 98 (251)	Es 99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

Electronegativity

Electronegativity Values

☐	< 1.0
☐	1.0 — 1.4
☐	1.5 — 1.9
☐	2.0 — 2.4
☐	2.5 — 2.9
☐	3.0 — 4.0
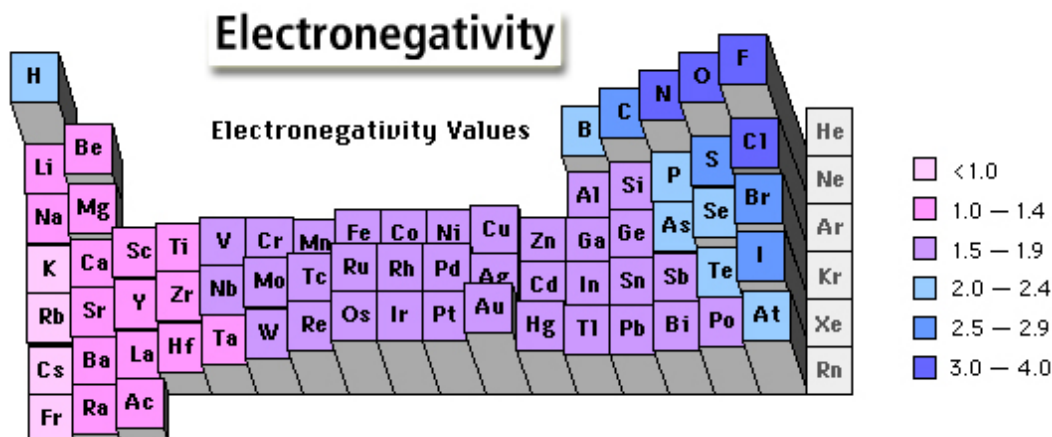
Question 1
8 Points

To answer the questions, interpret the following Lewis diagram for F_2CO

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

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

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

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

Question 2
9 Points

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

NO^+

FCN

$CHCl_3$

Question 3
9 Points

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

CH_3OCH_3

CH_3COCH_3

CH_3COOCH_3

Question 4
6 Points

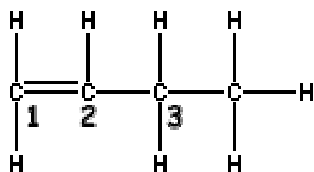NO_2^- has resonance structures – draw them.

Question 5
8 Points

What is the name of the compound with the formula:

a) N_2O_5 _____

b) CCl_4 _____

What is the formula for:
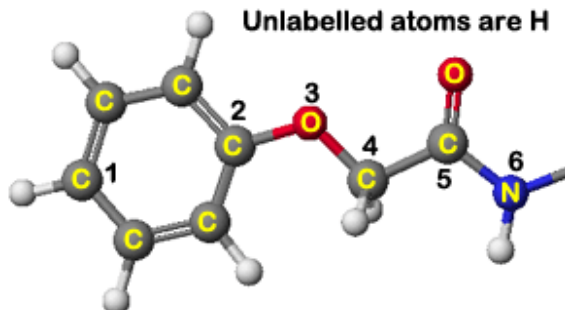
a) Carbon monoxide _____

b) Disulfur decafluoride _____

Question 6
6 Points

What is the bond angle about:
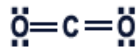
a) 1: _____

b) 2: _____

c) 3: _____

Question 7
6 Points

Unlabelled atoms are H

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

C1 _____

N6 _____

C5 _____

Question 8
16 Points

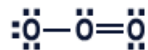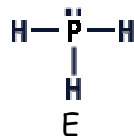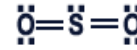:C̈l—Be—C̈l:

A

Ö=C=Ö

B

H—Ö—H

C

:Ö—Ö=Ö

D

H—P̈—H
|
H

E

Ö=S̈=Ö

F

The following questions relate to the Lewis Structures depicted above

a) The molecules that **disobey** the **Octet Rule**: _____

b) **C, D and E** – the one with the **smallest** bond angle: _____

c) The **molecular geometry** of **D**: _____

d) The **molecular geometry** of **E**: _____

e) The **molecules** with a bond angle of **180°**: _____

f) **B, D and E** – the one that is **non polar**: _____

g) **C** – **Polar** or **non polar**? _____

h) The **Electron Pair Geometry** of **F**: _____

Question 9
4 Points

$ClO^-(aq) + H_2O(l) \Leftrightarrow HClO(aq) + OH^-(aq)$ K = **2.86×10⁻⁷** at 298K.
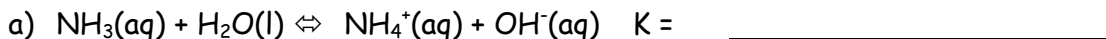
Assuming that you start with just **ClO⁻**, and that no **HClO** or **OH⁻** is initially present, which of the following best describes the equilibrium system?

a) The forward reaction is favored at equilibrium.

b) Appreciable quantities of all species are present at equilibrium.
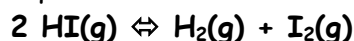
c) The reverse reaction is favored at equilibrium.

Question 10
6 Points

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

a) $NH_3(aq) + H_2O(l) \Leftrightarrow NH_4^+(aq) + OH^-(aq)$ K = _____

b) $2\ H_2S(g) \Leftrightarrow 2\ H_2(g) + S_2(g)$ K = _____

c) $AgCl(s) \Leftrightarrow Ag^+ + Cl^-$ K = _____

Question 11
6 Points

Consider the following system at equilibrium at 698 K:
$$2\ HI(g) \Leftrightarrow H_2(g) + I_2(g)$$
When some **HI(g)** is **added** to the equilibrium system at constant temperature:

The reaction must:	The concentration of I_2 will:
a) Run in the **forward** direction.	a) **Increase**
b) Run in the **reverse** direction.	b) Remain the **same**
c) Remain the **same**.	c) **Decrease**

Question 12
6 Points

Consider the following system at equilibrium at 298 K:
$$HCN(aq) + H_2O(l) \Leftrightarrow H_3O^+(aq) + CN^-(aq)$$
When some **OH⁻** is **added** to the equilibrium system at constant temperature:

The reaction must:	The concentration of **CN⁻** will:
a) Run in the **forward** direction.	a) **Increase**
b) Run in the **reverse** direction.	b) Remain the **same**
c) Remain the **same**.	c) **Decrease**

Question 13
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 **increased**:

The reaction must:	The concentration of Cl_2 will:
a) Run in the **forward** direction.	a) **Increase**
b) Run in the **reverse** direction.	b) Remain the **same**
c) Remain the **same**.	c) **Decrease**

Question 14 In our discussion on the consequences of molecular polarity, the depiction below was used to discuss:

4 Points

Nonpolar   Nonpolar
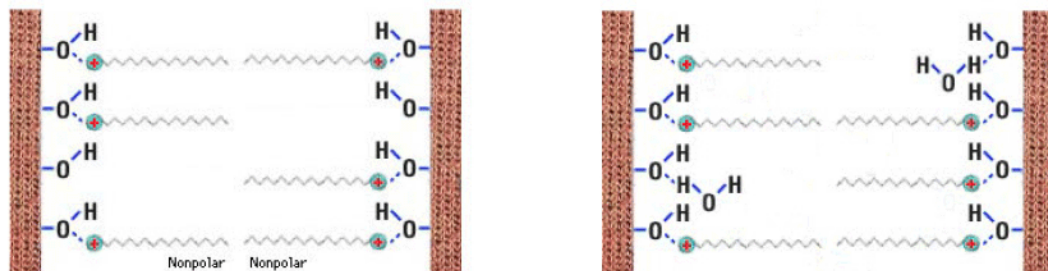
a) Fabric softeners

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 _____