

The Periodic Table

<i>IA</i> H 1 1.01																	<i>VIIIA</i> He 2 4.00
<i>IIA</i> Li 3 6.94	Be 4 9.01											<i>IIIA</i> B 5 10.81	<i>IVA</i> C 6 12.01	<i>V A</i> N 7 14.01	<i>VIA</i> O 8 16.00	<i>VIIA</i> F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31	<i>IIIB</i>	<i>IVB</i>	<i>VB</i>	<i>VIB</i>	<i>VII B</i>	<i>VIII B</i>	<i>VIII B</i>	<i>VIII B</i>	<i>IB</i>	<i>IIB</i>	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

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Last _____

First _____

Question 1
5 PointsDraw a Lewis structure for F_2CO in which the central **C** atom obeys the octet rule, and answer the questions based on your drawing.

1. The **number of lone pairs** on the central **C** atom: _____
2. The central **C** atom forms _____ **single bonds**.

Question 2
5 PointsDraw a Lewis structure for PO_4^{3-} in which the central **P** atom obeys the octet rule, and answer the questions based on your drawing.

1. The **number of lone pairs** on this **structure** is: _____
2. The central **P** atom forms _____ **double bonds**.

Question 3
9 PointsDraw Lewis Structures for **xenon trioxide** and **sulfur dioxide**. (Include any resonance structures if applicable)Question 4
8 PointsDraw a Lewis diagram for $\text{CH}_3\text{CH}_2\text{COOH}$. Use your diagram to answer the following questions. **Count double bonds as 2 bonds**.

- a. The number of **C-H** bonds = _____
- b. The number of **O-H** bonds = _____
- c. The number of **C-C** bonds = _____
- d. The number of **C-O** bonds = _____
- e. Total number of **unshared pairs** = _____

Question 5
8 Points

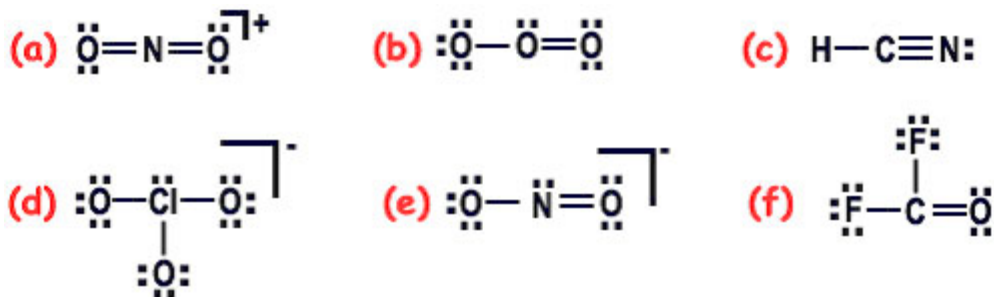
What is the name of the compound with the formula:

1. PCl_5 _____
2. O_2F_2 _____

What is the formula for:

3. Tetraphosphorus decaoxide _____
4. Carbon tetrabromide _____

Question 6
14 Points



The following questions relate to the Lewis Structures depicted above

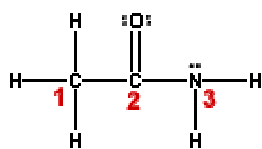
- The **molecule(s)** whose **electron pair geometry** is linear: _____
- The **bond angle** about the **Cl** atom in **d**: _____
- The **molecular geometry** of **d**: _____
- The **molecular geometry** of **e**: _____
- Number** of molecules with a **bent molecular geometry**: _____
- The **three molecules** with the ~ **same bond angle**: _____
- Of these*** the **one** with a **bond angle** closest to 120° : _____
[*Answers for 6f]

Question 7
6 Points

The molecules CH_4 , CHCl_3 , CH_2Cl_2 , CHCl_3 and CCl_4 all have the same **molecular geometry** - **tetrahedron** - which if any of these molecules are nonpolar?

Nonpolar: _____

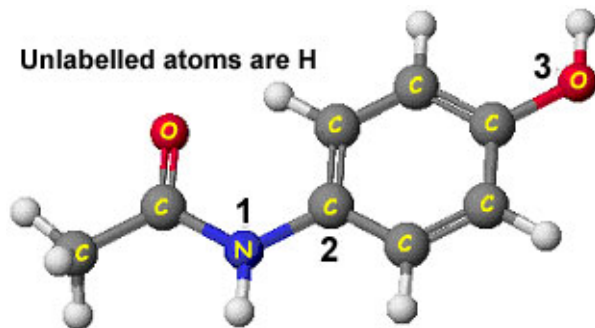
Question 8
6 Points



What is the bond angle about:

- C2**: _____
- N3**: _____

Question 9
9 Points



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

- _____
- _____
- _____

Question 10
6 Points

The order (**most soluble to least soluble**) of **solubility in water** for the following molecules is:

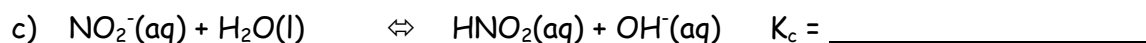
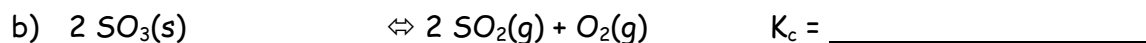


What would you anticipate the order to be (**most soluble to least soluble**) in carbon tetrachloride, CCl_4 _____

In one sentence, justify your choice.

Question 11 Write the **equilibrium constant expression**, K_c , for the following reactions:

6 Points



Question 12 $\text{HNO}_2(\text{aq}) + \text{HS}^-(\text{aq}) \rightleftharpoons \text{NO}_2^-(\text{aq}) + \text{H}_2\text{S}(\text{aq})$ $K = 4.50 \times 10^3$ at 298K.

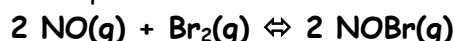
3 Points

Assuming that you start with equal concentrations of HNO_2 and HS^- , and that no NO_2^- or H_2S is initially present, which of the following best describes the equilibrium system?

- Appreciable quantities of all species are present at equilibrium.
- The forward reaction is favored at equilibrium.
- The reverse reaction is favored at equilibrium.

Question 13 Consider the following system at equilibrium at 298 K:

9 Points



When some $\text{Br}_2(\text{g})$ is **removed** from the equilibrium system at constant temperature:

The **reaction** must:

- Run in the forward direction.
- Run in the reverse direction.
- Remain the same.

The concentration of **NO** will:

- Remain the same.
- Increase.
- Decrease.

The **equilibrium constant** K will:

- Remain the same.
- Increase.
- Decrease.

Question 14 Consider the following system at equilibrium at 698 K:

6 Points



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

The concentration of **I₂** will:

- Remain the same.
- Increase.
- Decrease.

The **equilibrium constant** K will:

- Remain the same.
- Increase.
- Decrease.

Exam II Score