The Periodic Table

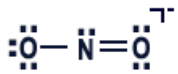
IA																	VIIIA
H 1 1.01	IIA											IIIA	IVA	VA	VIA	VIIA	He 2 4.00
Li 3 6.94	Be 4 9.01											B 5 10.81	C 6 12.01	N 7 14.01	O 8 16.00	F 9 19.00	Ne 10 20.18
Na 11 22.99	Mg 12 24.31	IIIB	IVB	VB	VIB	VIIB	VIIIB	VIIIB	VIIIB	IB	IIB	Al 13 26.98	Si 14 28.09	P 15 30.97	S 16 32.07	Cl 17 35.45	Ar 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 (8 Points)

To answer the questions, interpret the following Lewis diagram for NO_2^-.
With respect to the **central nitrogen atom**:



a) The number of **lone pair** **1**

b) The number of **single** bond **1**

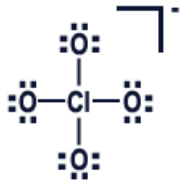
c) The number of **double** bond **1**

d) The number of **resonance** structures **2**

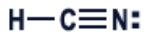
Question 2 (16 Points)

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

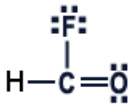
ClO_4^-



HCN



HFCO



CO

Question 3 (8 Points)

Draw a Lewis structure (*on scrap paper provided*) for **CH_3COOCH_3**. Use your diagram to answer the following questions.

a) The number of C-H bonds = **6**

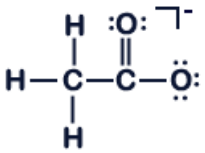
b) The number of C-O single bonds = **2**

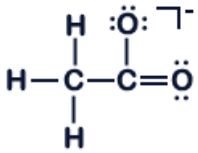
c) The number of C-C single bonds = **1**

a) The number of C-O double bonds = **1**

Question 4 (8 Points)

CH_3COO^- has resonance structures – draw them.





Question 5 (8 Points)

What is the name of the compound with the formula:

a) **N_2O_4** **Dinitrogen tetraoxide**

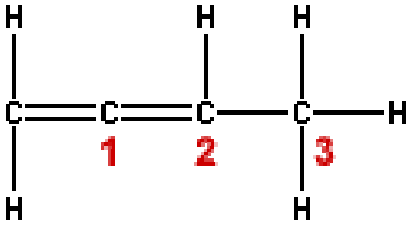
b) **PCl_5** **Phosphorus pentachloride**

What is the formula for:

a) **Sulfur trioxide** **SO_3**

b) **Carbon tetrachloride** **CCl_4**

Question 6
6 Points



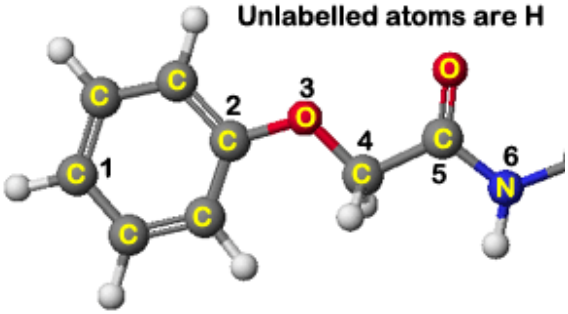
What is the bond angle about:

a) **1**: 180^0

b) **2**: 120^0

c) **3**: 109^0

Question 7
6 Points



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

O3 ~ 109^0

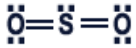
C4 109^0

C5 120^0

Question 8
16 Points

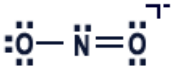
A

B

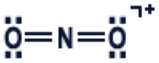


C

D



E



F

The following questions relate to the Lewis Structures depicted above

i. The number of molecules that **disobey** the **Octet Rule**: **2**

ii. **D, E and F** – the one with the **smallest** bond angle: **D**

iii. The **molecular geometry** of **D**: **Bent/Angular (109^0)**

iv. The **molecular geometry** of **E**: **Bent/Angular (120^0)**

v. The **number** of **molecules** with a bond angle of **~120^0**: **2**

vi. **D, E and F** – the one that is **non polar**: **F**

vii. **B – Polar** or **non polar**? **Polar**

viii. The **Electron Pair Geometry** of ***C***: **Trigonal planar**

Question 9
5 Points

$HClO(aq) + CN^- \Leftrightarrow ClO^- + HCN(aq)$ K = **87.5** at 298K.

Assuming that you start with equal concentrations of **HClO** and **CN^-**, and that no **ClO^-** or **HCN** 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 **9 Points** Write the **equilibrium constant expression**, K, for the following reactions:

a) $HCN(aq) + H_2O(l) \Leftrightarrow H_3O^+ + CN^-$ K = $[H_3O^+][CN^-]/[HCN]$

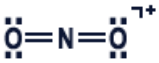
b) $2\ SO_2(g) + O_2(g) \Leftrightarrow 2\ SO_3(g)$ K = $[SO_3]^2/[SO_2]^2[O_2]$

c) $Ag^+ + Cl^- \Leftrightarrow AgCl(s)$ K = $1/[Ag^+][Cl^-]$

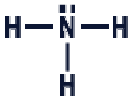
Question 11 **5 Points** Which of the following molecules has the smallest bond angle?

Circle your choice.

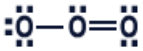
A



B

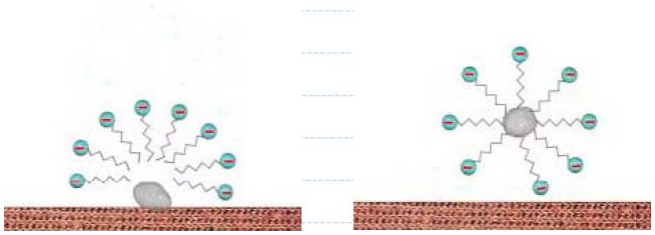


C



D

Question 12 **5 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