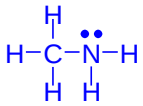
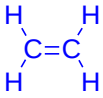
CHM 1321 A
Assignment 1 Answers

1) Draw Lewis structures for the following molecules:

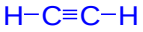
(a) CH_3NH_2



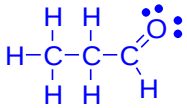
(b) CH_2CH_2



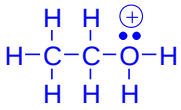
(c) C_2H_2



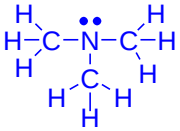
(d) CH_3CH_2CHO



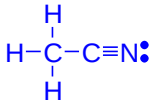
(e) $CH_3CH_2OH_2^+$



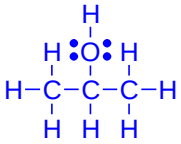
(f) $(CH_3)_3N$



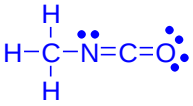
(g) CH_3CN



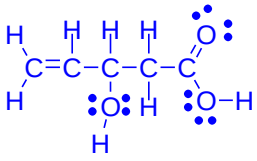
(h) $CH_3CH(OH)CH_3$



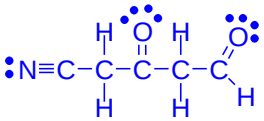
(i) CH_3NCO



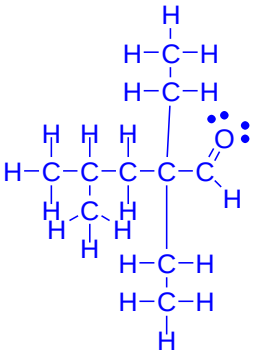
(j) $CH_2CHCH(OH)CH_2CO_2H$



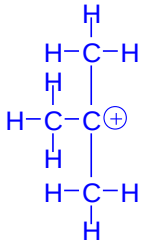
(k) $NCCH_2COCH_2CHO$



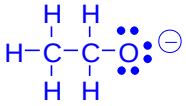
(l) $CH_3CH(CH_3)CH_2C(CH_2CH_3)_2CHO$



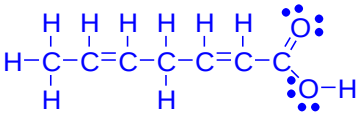
(m) $(CH_3)_3C^+$



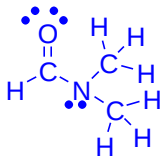
(n) $CH_3CH_2O^-$



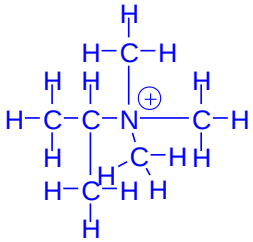
(o) $CH_3CHCHCH_2CHCHCO_2H$



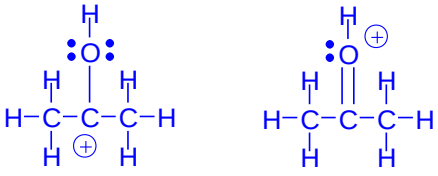
(p) $HC(O)N(CH_3)_2$



(q) $[(CH_3)_2CHN(CH_3)_3]^+$



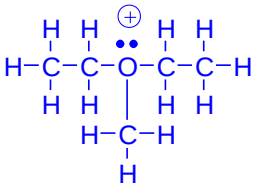
(r) $[CH_3C(OH)CH_3]^+$ (two structures)



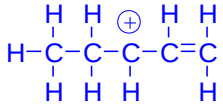
(s) $[(CH_3CH_2)_2O(CH_3)]^+$

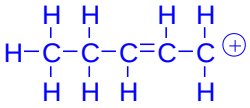
(t) $[CH_3CNH]^+$ (two structures)

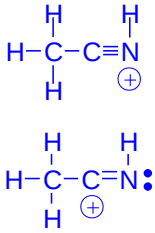
(u) $[CH_3CH_2CHCHCH_2]^-$ (two structures)



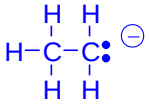
(v) $[CH_3CH_2CHCHCH_2]^+$ (two structures)

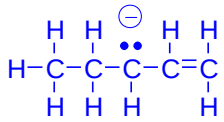


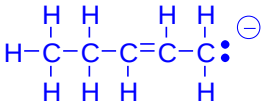




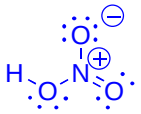
(w) $[CH_3CH_2]^-$



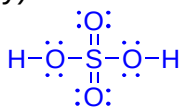




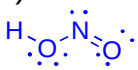
(x) HNO_3



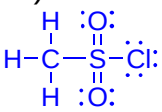
y) H_2SO_4



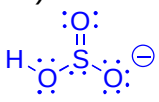
z) HNO_2



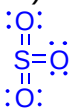
aa) CH_3SO_2Cl



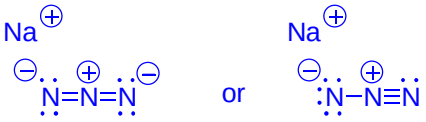
bb) HSO_3^-



cc) SO_3



dd) NaN_3



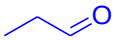
2) Draw all of the structures in question 1 using line notation.

(a) CH_3NH_2

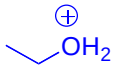
(b) CH_2CH_2

(c) C_2H_2

(d) CH_3CH_2CHO



(e) $CH_3CH_2OH_2^+$

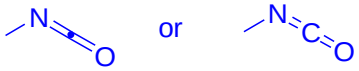


(f) $(CH_3)_3N$

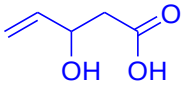
(g) CH_3CN

(h) $CH_3CH(OH)CH_3$

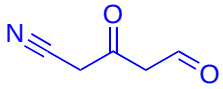
(i) CH_3NCO



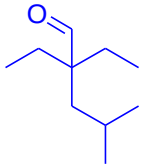
(j) $CH_2CHCH(OH)CH_2CO_2H$



(k) $NCCH_2COCH_2CHO$

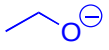


(l) $CH_3CH(CH_3)CH_2C(CH_2CH_3)_2CHO$

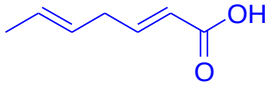


(m) $(CH_3)_3C^+$

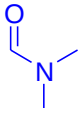
(n) $CH_3CH_2O^-$



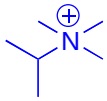
(o) $CH_3CHCHCH_2CHCHCOOH$



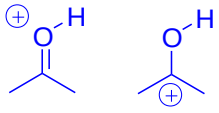
(p) $HC(O)N(CH_3)_2$



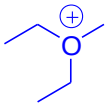
(q) $[(CH_3)_2CHN(CH_3)_3]^+$



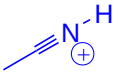
(r) $[CH_3C(OH)CH_3]^+$ (two structures)

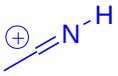


(s) $[(CH_3CH_2)_2O(CH_3)]^+$

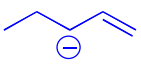


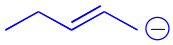
(t) $[CH_3CNH]^+$ (two structures)



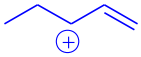


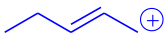
(u) $[CH_3CH_2CHCHCH_2]^-$ (two structures)





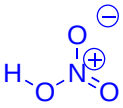
(v) $[CH_3CH_2CHCHCH_2]^+$ (two structures)



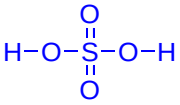


(w) $[CH_3CH_2]^-$

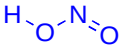
(x) HNO_3



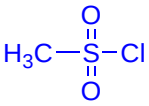
y) H_2SO_4



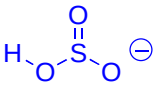
z) HNO_2



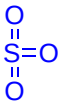
aa) CH_3SO_2Cl



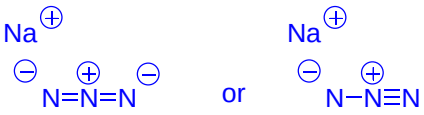
bb) HSO_3^-



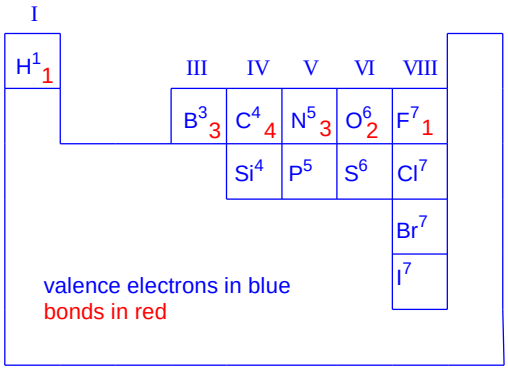
cc) SO_3



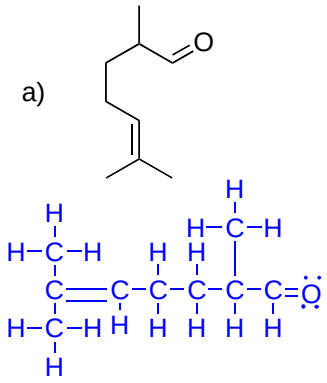
dd) NaN_3

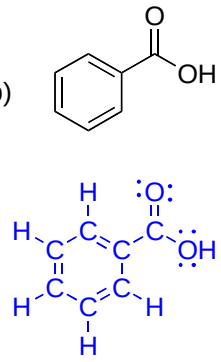


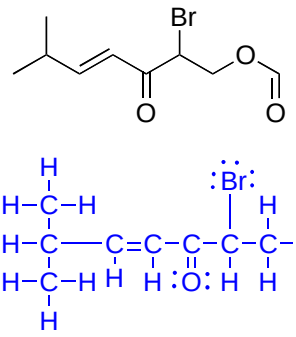
3) There is a small portion of the periodic table that you must know to do organic chemistry. Construct this from memory including the group numbers, bonds for neutral atoms and numbers of valence electrons.

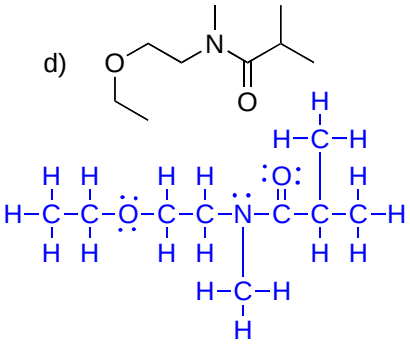


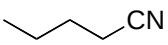
4) Convert the following to Lewis structures:

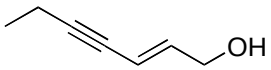
a) 

b) 

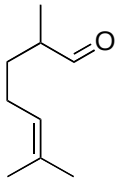
c) 

d) 

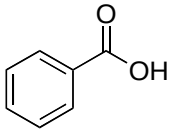
e) 

f) 

5) Draw all of the structures in question 4 using condensed notation.

a) 

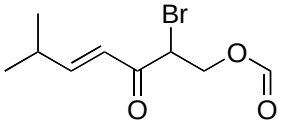
$(CH_3)_2CCHCH_2CH_2CHCH_3CHO$

b) 

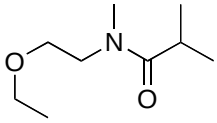
$C_6H_5CO_2H$

or

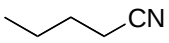
$CHCHCHCHCHCHCO_2H$

c) 

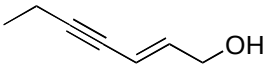
$(CH_3)CHCHCHCOCHBrCH_2OCHO$

d) 

$CH_3CH_2OCH_2CH_2NCH_3COCH(CH_3)_2$

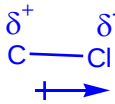
e) 

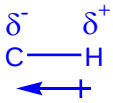
$CH_3CH_2CH_2CH_2CN$

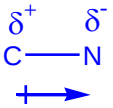
f) 

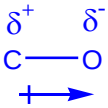
$CH_3CH_2CCCHCHCH_2OH$

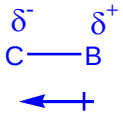
6) Show the direction of the dipole moments of the following bonds.

(a) C-Cl 

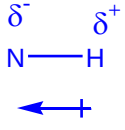
(b) C-H 

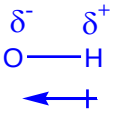
(c) C-N 

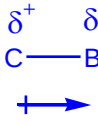
(d) C-O 

(e) 

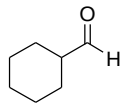
C-B 

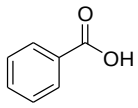
(f) N-H 

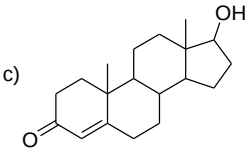
(g) O-H 

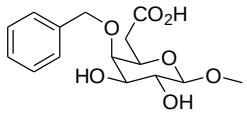
(h) C-Br 

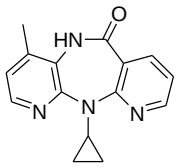
7) Provide molecular formulas for each of the following.

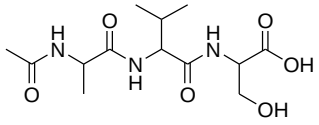
a) 
$C_7H_{12}O$

b) 
$C_7H_6O_2$

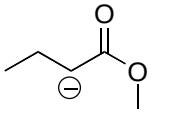
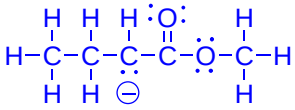
c) 
$C_{19}H_{28}O_2$

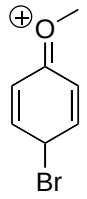
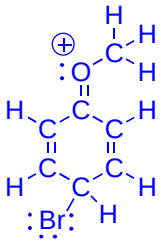
d) 
$C_{15}H_{20}O_7$

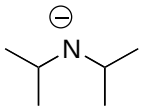
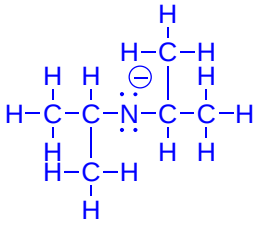
e) 
$C_{15}H_{14}N_4O$

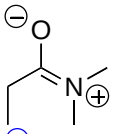
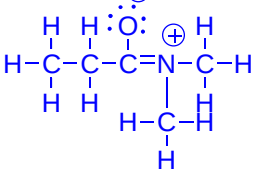
f) 
$C_{13}H_{23}N_3O_6$

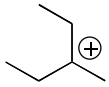
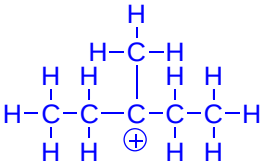
8) Convert the following to Lewis structures

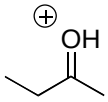
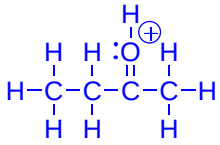
a) 


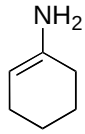
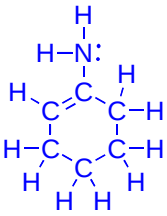
b) 


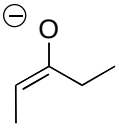
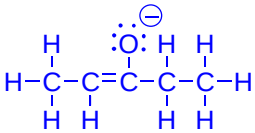
c) 


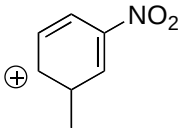
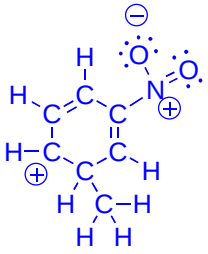
d) 


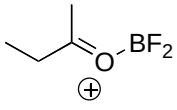
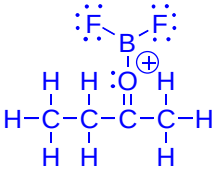
e) 


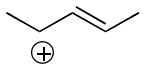
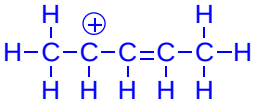
f) 


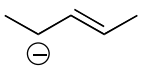
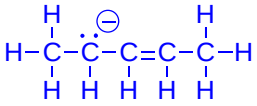
g) 


h) 


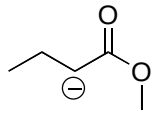
i) 


j) 


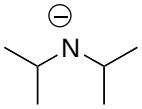
k) 


l) 


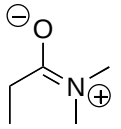
9) Draw each of the open-chain molecules in question 8 as condensed structures.

a) 

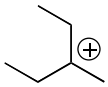
$[CH_3CH_2CHCO_2CH_3]^-$

c) 

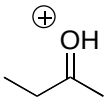
$[((CH_3)_2CH)_2N]^-$

d) 

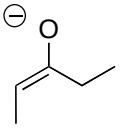
$CH_3CH_2CON(CH_3)_2$

e) 

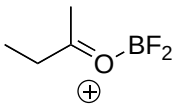
$[(CH_3CH_2)_2CCH_3]^+$

f) 

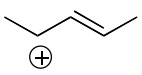
$[CH_3CH_2COHCH_3]^+$

h) 

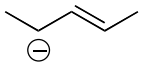
$[CH_3CHCOCH_2CH_3]^-$

j) 

$[CH_3CH_2C(OBF_2)CH_3]^+$

k) 

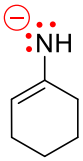
$[CH_3CHCHCHCH_3]^+$

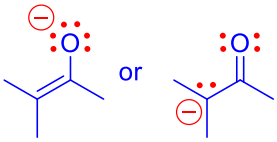
l) 

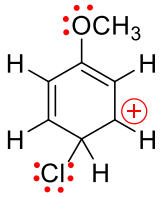
$[CH_3CHCHCHCH_3]^-$

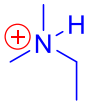
10) Each of the following molecules carries a charge (+ or -). Identify the charged atom in each of them.

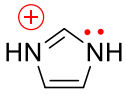
a) 

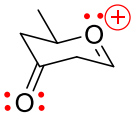
b) 

c) $(CH_3)_2CC(O)CH_3$ 

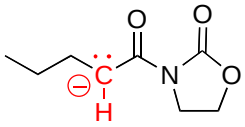
d) 

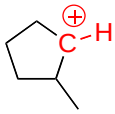
e) $(CH_3)_2NHCH_2CH_3$ 

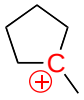
f) 

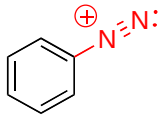
g) 

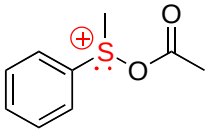
11) Each of the following molecules carries a charge (+ or -). At each charge site, draw the full Lewis structure to account for the charge.

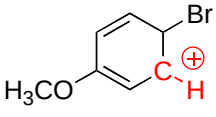
a) 

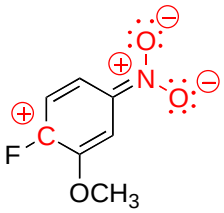
b) 

c) 

d) 

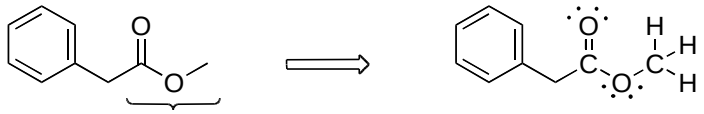
e) 

f) 

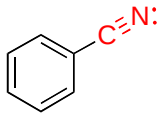
g) 

12) Redraw the following molecules showing the indicated functional group in expanded Lewis form.

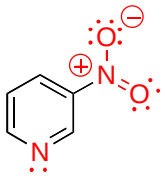
example:



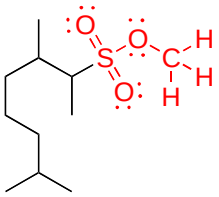
a)



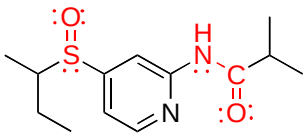
b)



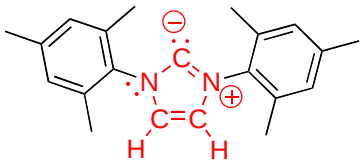
c)



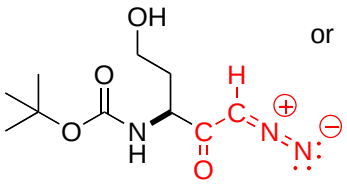
d)



e)



f)



or