Ch. 9 ~~2, 7, 11, 15, 17, 21, 23, 27, 29, 31, 34, 38, 40,~~
~~46, 48, 50, 57, 59, 61, 65, 70, 71, 74, 76~~

2(a) covalent
(b) ionic
(c) metallic

7(a) ICl_3 covalent
(b) N_2O covalent
(c) LiCl ionic

11(a) $\cdot Ba \cdot$ (b) $:\ddot{K}r:$ (c) $:\ddot{B}r\cdot$

15(a) $\cdot\dot{X}:$ s^2p^3 Group 15

(b) $\cdot\dot{X}\cdot$ s^2p^2 Group 14

17(a) as charge ↑, lattice energy ↑
as radius ↑, lattice energy ↓
(b) increasing lattice energy A < B < C

23(a) X_3PO_4 X alkali metal, Group #1

(b) $X_2(SO_4)_3$ X^{3+} Group 13

(c) $X(NO_3)_2$ X^{2+} alkaline earth metal, Group #2

27(a) $\underset{2+}{Ca}\,\underset{2-}{O}$ or $\underset{2+}{Ca}\,\underset{2-}{S}$ (b) $\underset{2+}{Ba}\,\underset{2-}{O}$ or $\underset{2+}{Sr}\,\underset{2-}{O}$

↑ larger lattice, smaller radius

↓ larger lattice energy

29 (a) NaF or NaCl → smaller energy, larger radius

(b) K_2O or K_2S → smaller energy, larger radius

31 (a) $\Delta H_{lattice} = ?$ kJ

$MgF_2 \rightarrow Mg^{2+} + 2F^-$

$LiF = 1050$ kJ/mol

$NaCl =$

$148 + 159 + 738 + 1450 + 2(-328) + 1123 = \boxed{2962\ kJ}$

$2F^-$ need to be made

Switch sign because breaking MgF_2 not making

(32) Al_2O_3 harder the compound, the higher the lattice energy. Yes - large charge magnitude increase coulombic attraction, thus increasing lattice energy

(38) C_6H_6 boils - consists of C_6H_6 molecules. Does not break the bond, it disrupts the IMF forces

(40) (a) $HF < HCl < HI$ — large radius = long bond length

(b) $C{=}O < CO < CS$ — double bond = short bond length

(c) $NH < ND < NS$

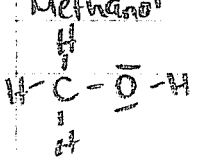
(46) ethanol

more heat released because more moles product formed

$C_2H_6O + 5O_2 \rightarrow 2CO_2 + 3H_2O$

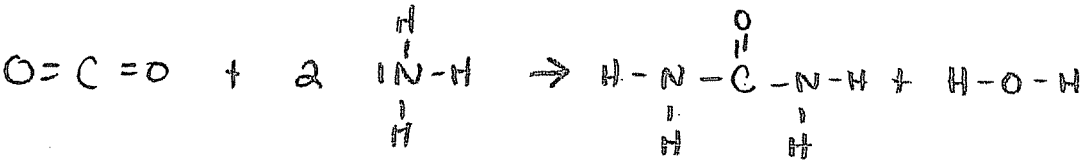
vs.

Methanol



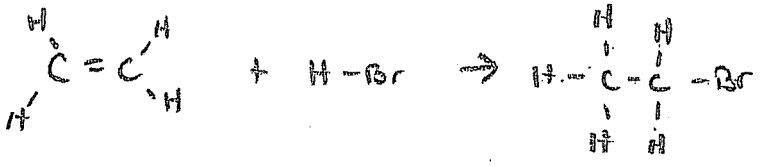
$\frac{1}{1} CH_4O + \frac{3}{2} O_2 \rightarrow \frac{2}{1} CO_2 + \frac{4}{2} H_2O$

compare 1 mole vs 1 mole

(48) 

$2(745) + 6(391) + (4* -391) + (2* -305) + (-745) + (2* -4$

$\Delta H = -17\ KJ$

(50) 

$614 + 4(413) + 363 + (5* -413) + (-347) + (-276)$

$\Delta H = -59 KJ$

(57) (a) $I < Br < N$

(b) $Ca < H < F$

(59) (a) $Cl > Br > P$

(b) $F > O > I$

(61) (a) $\overset{\delta+}{Br} - \overset{\delta-}{Cl}$ (b) $\overset{\delta-}{F} - \overset{\delta+}{Cl}$ (c) $\overset{\delta+}{H} - \overset{\delta-}{O}$

(d) $\overset{\delta-}{Se} - \overset{\delta+}{H}$ (e) $\overset{\delta+}{As} - \overset{\delta-}{H}$ (f) $\overset{\delta+}{S} - \overset{\delta-}{N}$

(65)

(a)	KCl	ionic
(b)	P_4	covalent - nonpolar
(c)	BF_3	covalent - polar
(d)	SO_2	covalent - polar bonds
(e)	Br_2	covalent - nonpolar
(f)	NO_2	covalent - polar bonds

$NO_2 < SO_2 < BF_3$

Name

70 @ MP Na = 89°C
MP K = 63°C
radius is smaller so stronger metallic attractions make it more difficult to melt

(b) Li MP 180°C $1s^2 2s^1$ both metals
Be MP 1287°C $1s^2 2s^2$

more EN
full s^2

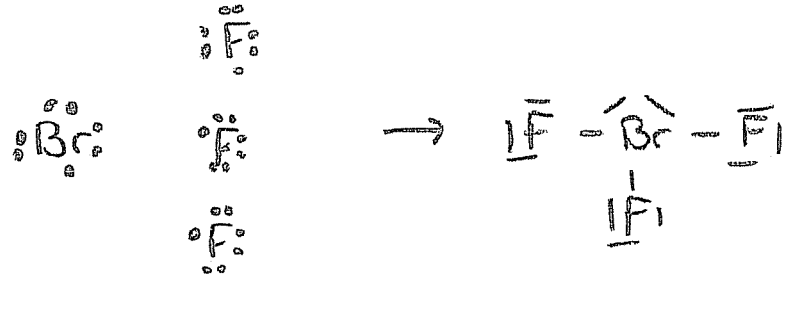
more electrons → so more difficult to break molecular attractions

(c) Li MP 180 C
Li BF +1100°C takes significantly more energy to have Li leave in the gaseous form & break all metallic attactions from sea of electrons

71 @ electrons in Mg are mobile where electrons in MgF_2 are highly ordered in crystal lattice. Mobil electrons allow for deformation, instead of fracture.

74 BrF_3

exception to octet due to empty d orbitals

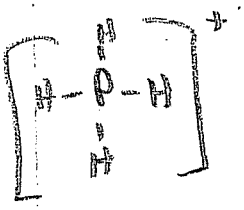


76 @ $H_2 + Cl_2 \rightarrow 2HCl$ $432 + 243 + (2 * -427) = -179$ KJ
(b) $H_2 + I_2 \rightarrow 2HI$ $432 + 151 + (2 * -295) = -7$ KJ
(c) $2H_2 + O_2 \rightarrow 2H_2O$ $(2 * 432) + 498 + (4 * -467) = -509$ KJ ☆

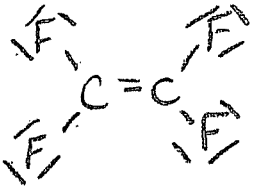
Ch. 10 ~~4~~, ~~6~~, ~~8~~, ~~10~~, ~~12~~, ~~14~~, ~~23~~, ~~35~~, ~~37~~, ~~39~~, ~~45~~, ~~47~~, ~~56~~, ~~58~~, ~~62~~, ~~63~~, ~~78~~, ~~92~~

4 (a) must have empty d orbitals S Se Cl

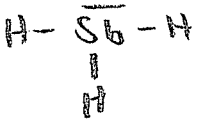
6 (a) PH_4^+
$5 + 4 - 1 = 8$



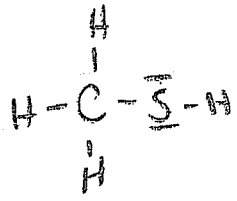
(b) C_2F_4
$8 + 28 = 36$



(c) SbH_3
$5 + 3 = 8$

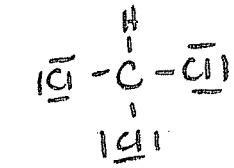


8 (a) CH_4S
$4 + 4 + 6 = 14$

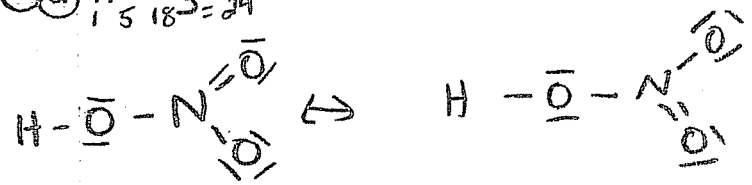


(b) S_2Cl_2
$12 + 14 = 20 - 6 = 20 - 12 = 8$

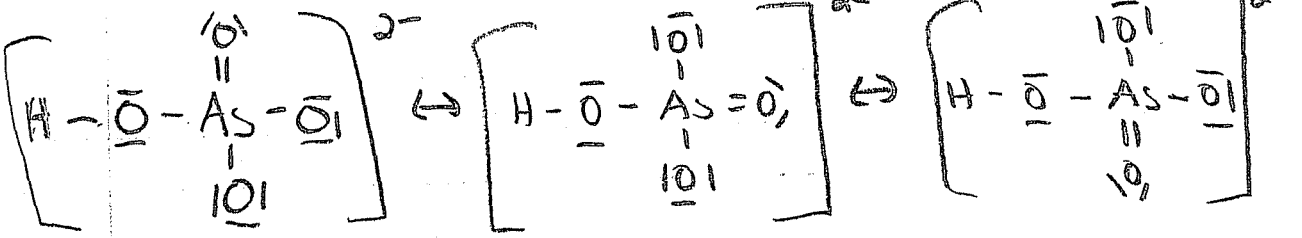
(c) $CHCl_3$



10 (a) HNO_3
$1 + 5 + 18 = 24$

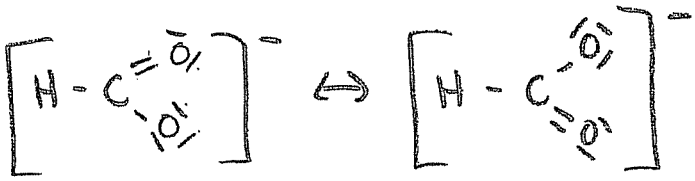


(b) $HAsO_4^{2-}$
$1 + 5 + 24 + 2 = 32$



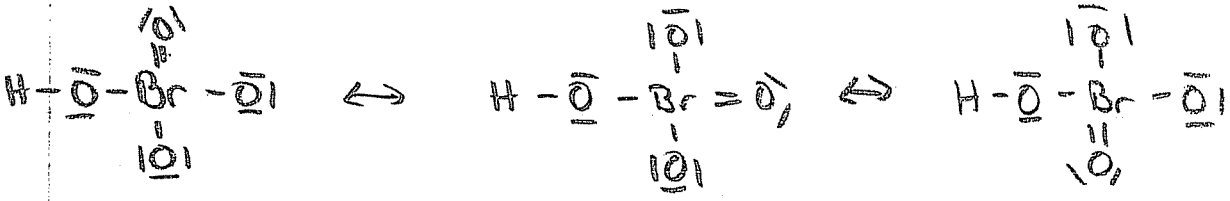
(12)(a) HCO_2^-

$1+4+12+1 = 18$



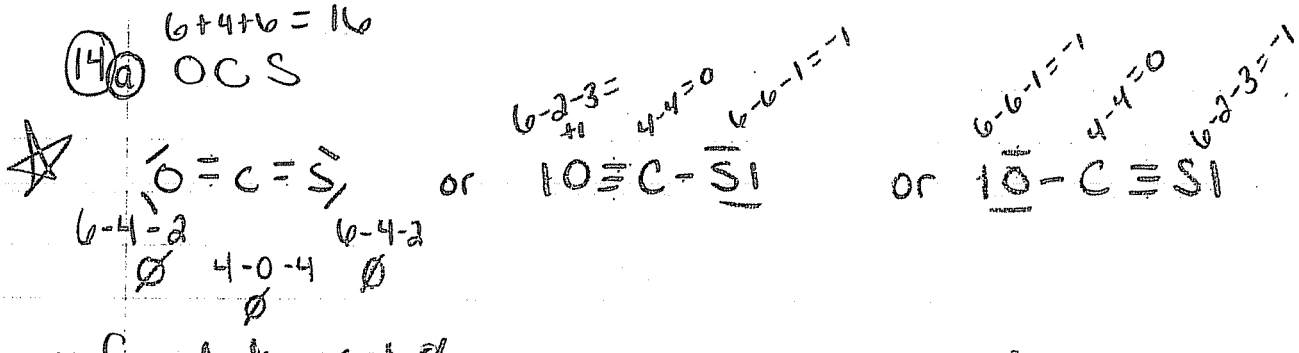
(b) $HBrO_4$

$1+7+24 = 32$



(14)(a) OCS

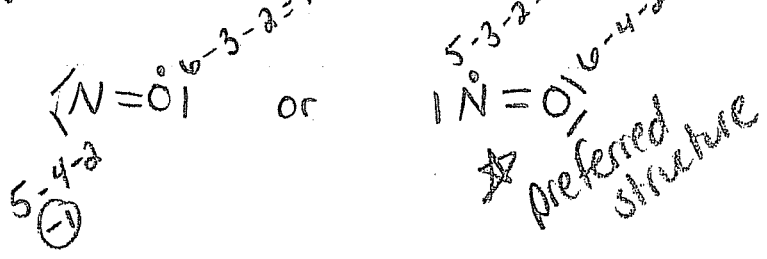
$6+4+6 = 16$



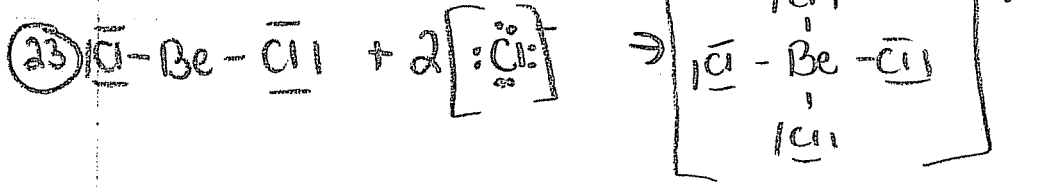
formal charges at Ø

(b) NO

$5+6=11$

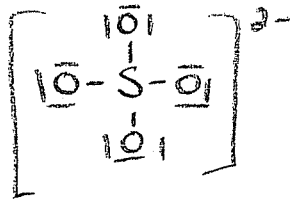


(23)



(35) (a) SO_4^{2-}

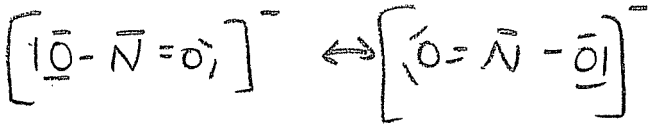
$6+24+2=32$



tetrahedral – electron domain
tetrahedral – shape
109.5° = bond angle

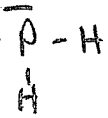
(b) NO_2^-

$5+12+1=18$



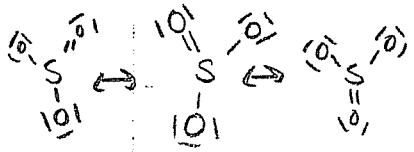
EO trig planar
shape bent
Bond angle – slightly less than 120°

(c) PH_3 $5+3=8$



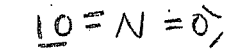
EO = tetrahedral
shape = trig pyramidal
bond angle slightly less 109.5°

(37) SO_3 $6+18=24$



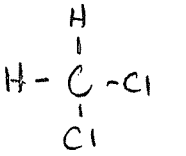
EO trig planar
shape trig planar
bond angle 120°

N_2O $10+6=16$



EO linear
Shape linear
bond angle 180

CH_2Cl_2



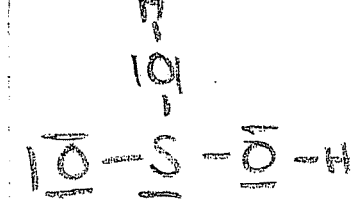
EO tetrahedral
shape tetrahedral
bond angle 109.5°

(39) (a) square pyramidal — AX_5E — 90°

(b) T shaped — AX_3E_2 — 90°

(c) tetrahedral — AX_4 — 109.5°

45 @ H_2SO_3 — 2+6+18 = 24

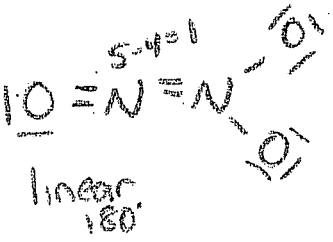


tetrahedral

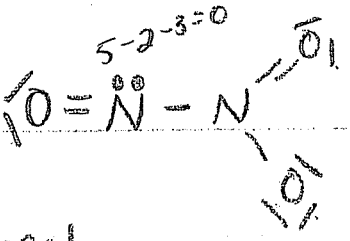
shape at S is trig pyramidal

bond angle = 109.5°

⑥ N_2O_3 — 10 + 18 = 28



or



bent
120

☆ better structure

did wrong one see end for #47

46 @

BF_3 — trigplanar 120°

BeF_2 — linear 180°

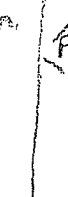
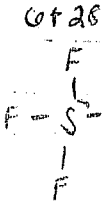
CF_4 — tetrahedral 109.5°

NF_3
trig pyramidal
less 109.5

OF_2
6+14 = 20

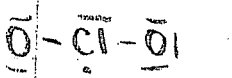
bent
less 109.5

(56)

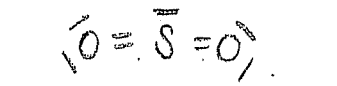
BF_3	PF_3	BrF_3	SF_4	SF_6
trig. planar	trig pyram.	$7+21=28$	$6+28=34$	Octahedral
nonpolar	polar			nonpolar
		t shaped	seesaw	
		polar	polar	

(58) ClO_2 vs. SO_2

$7+12=19$, $-18/3$ $\quad$ $6+12=18$



bent
polar



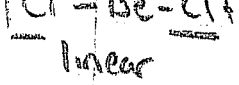
bent
polar
larger dipole due to difference in EN

(b) $\overrightarrow{H-Br}$ vs $\overrightarrow{HCl}$

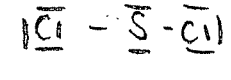
larger dipole as Cl - H ΔEN is greater

(c) $BeCl_2$ vs. SCl_2

$6+N=20$



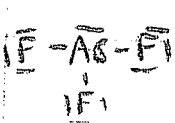
linear
nonpolar



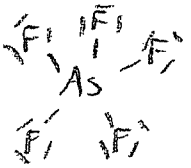
bent polar

(d) $5+21=26$ $\quad$ $5+35=4$

AsF_3 $\quad$ AsF_5

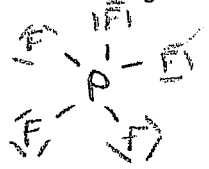


trig pyramidal
polar



trigonal bipyramidal
nonpolar

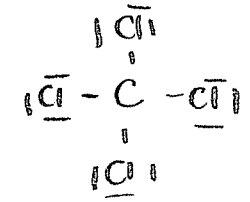
(62) (a) PF_5 $5+35=40$ AX_5



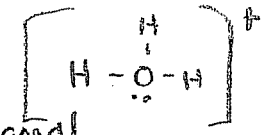
trigonal bipyramidal

(b) CCl_4 $4+28=32$ AX_4

tetrahedral

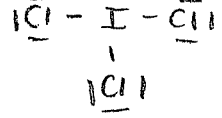


(c) H_3O^+ $3+6-1=8$ AX_3E



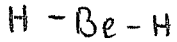
trigonal pyramidal

(d) ICl_3 $7+21=28$ AX_3E_2



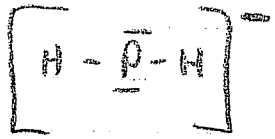
t-shaped

(e) BeH_2 $2+2=4$



linear AX_2

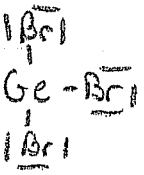
(f) PH_2^- $5+2+1=8$



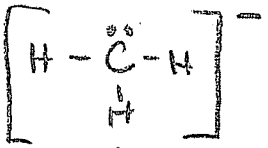
bent AX_2E_2

(g) $GeBr_4$ $4+28=32$

tetrahedral AX_4



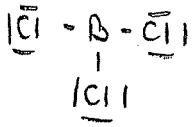
(h) CH_3^- $4+3+1=8$



trigonal pyramidal AX_3E

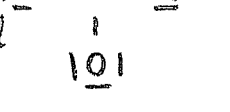
(i) BCl_3 $3+21=24$

trigonal planar AX_3



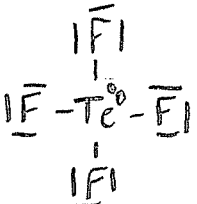
(k) XeO_3 $8+18=26$

trigonal pyramidal AX_3E



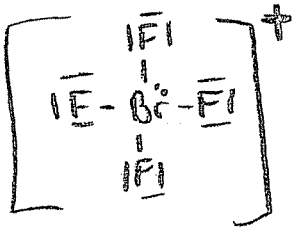
(l) TeF_4 $6+28=34$

see saw AX_4E



(j) BrF_4^+ $7+28-1=34$

see saw AX_4E



(63) See previous problem

(78) $24.8\%\ C \times \frac{1\,mol}{12.011\,g} = 2.06\,mol/2.06 = 1$

$2.08\%\ H \times \frac{1\,mol}{1.008\,g} = 2.06\,mol/2.06 = 1$

$73.1\%\ Cl \times \frac{1\,mol}{35.45\,g} = 2.06\,mol/2.06 = 1$

empirical formula = CHCl

empirical mass = 48.47 g/mol

at STP density = 4.3 g/L

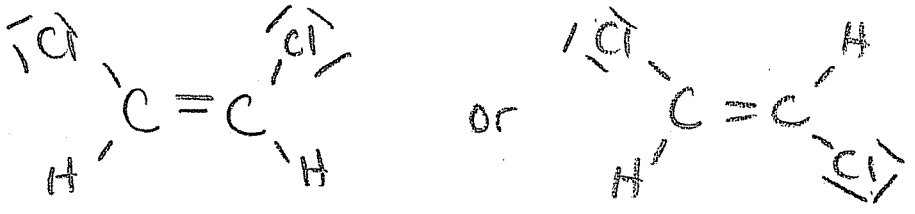
$$\text{Molar mass} = \frac{\text{density}(RT)}{P}$$

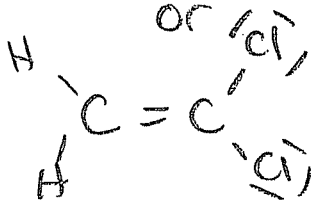
$$MM = \frac{4.3(0.0821)(273.15)}{1\,atm}$$

$$MM = 96.43\ g/mol$$

$$\frac{\text{molar mass}}{\text{empirical Mass}} = \frac{96.43}{48.47} = 2$$

Molecular formula = $C_2H_2Cl_2$

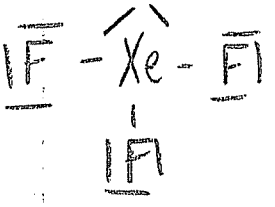


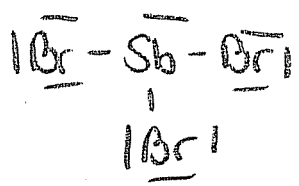


(92) (a)

XeF_3^+
$8+21=29-1=28$

$SbBr_3$
$5+21=26$

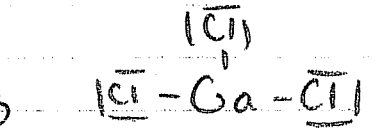




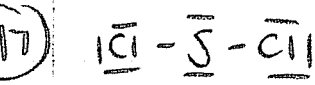
Match = A
T-Shaped

match = C
trigonal pyramidal

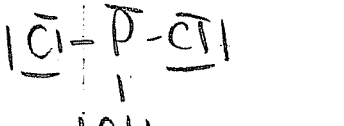
(c) $GaCl_3$
$3+21=24$

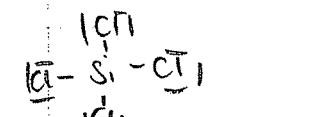


Match B
trigonal planar

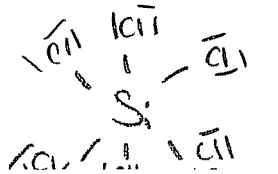
(97)  big atom, smaller decrease in bond ∠ of 109.5°

 Much smaller than 109.5°

 Slightly smaller than 109.5
Only 1 lone pair

 ideal at 109.5°

$SiCl_6^-$

 90°