Ch 8

① a) 4 v.e. = Group 14
b) 2 v.e. = Group 2
c) 5 v.e = Group 15

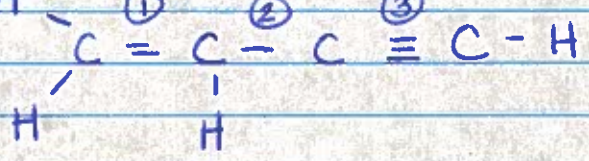
② a) AY, BX
b) AY greater charges, greater force
c) BX smallest charge, weakest force

③ a) if 3d = 7 e^- when +2 charge then atom has 2 more e^-, element ends in $3d^9$ = Cu (copper)
b) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^9$

④

A	7 v.e = F	Q	5 v.e = N
D	4 v.e = C	X	1 v.e = H
E	6 v.e = O	Z	1 v.e = H

⑤ a)



b) 3, 1, 2 stronger the bond, shorter the bond length

⑦ a) electrons in outer shell
b) 5 v.e = Group 15
c) $3s^2 3p^2$ = 4 v.e.

8) a) atoms are stable when they have 8 v.e. and are like noble gases with full outer shells
b) S = 6 v.e. gains 2
c) needs 3 $2s^2 2p^3$ = 5 v.e

Ch8 continued...

9) $1s^2 2s^2 2p^6 3s^2 3p^3$ (nonvalence e⁻ / valence e⁻) — valence e⁻ are the e⁻ reacting

11) a) Al — 3 v.e = Group 13

b) Br — 7 v.e. = Group 17

c) Ar — 8 v.e = Group 18

d) Sr — 2 v.e = Group 2

13) Mg → O — Mg loses 2e⁻, O gains 2e⁻

15) a) Al^{+3} F^{-1} AlF_3

b) K^+ S^{2-} K_2S

d) Mg^{2+} Al^{3-} Mg_3N_2

16) a) Ba^{2+} F^- BaF_2

b) Cs^+ Cl^- $CsCl$

c) Li^+ N^{3-} Li_3N

d) Al^{3+} O^{2-} Al_2O_3

Ch8 continued...

(19) a) energy required to separate one mole of solid ionic compound into gaseous ions
b) magnitude of charges } 2 most imp.
ionic radii
arrangement of ions in lattice

(20) a) NaCl 788 NaCl is longer since it takes less energy to break
KF 808

(21) KF 808 KF < CaO < ScN
CaO 3414 as the charge of ions
ScN 7547 increases the force holding the ions ↑
therefore the greater the force the higher the lattice energies

(22) a) i) ↑ ii) ↓
b) KBr < NaF < MgO < ScN
large ions small charge
greater ion charge higher lattice energy

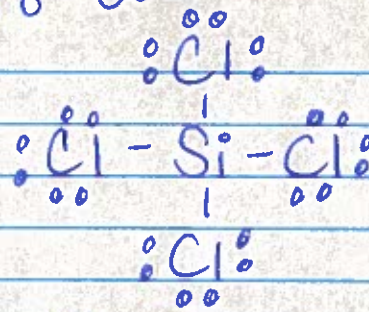
(24) a) Ba is larger than Ca
b) as ionic radii ↑, lattice energy ↓
c) BaO have greater ion charges

(29) a) bond formed by sharing e^- between 2 atoms
c) low boiling = covalent

(30) Ar - noble gas has full octet already

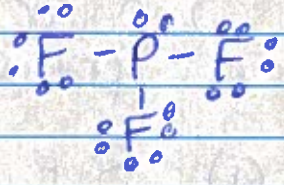
Ch 8 continued...

(31)

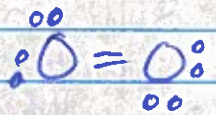


Si = 4
Cl = 7 × 4
32 total v.e.

(32) P = 5
F = 7 × 3
26 v.e.



(33) a)



2 × 6 = 12 v.e.

b) double bond is needed to complete the octet on each

c) stronger the bond the closer the atoms

(34) a)

b) longer than O_2, single bonds are longer than double bond

(35) a) ability to attract e^- to itself

c) F smallest atom w/ strongest nucleus close to v.e.

d) Fr largest atom

(36) a) increases w/ ↑ in protons (except noble gases)

b) decrease atoms get large hard to attract e- when nucleus is far

(37) a) O
b) C
c) P
d) Be

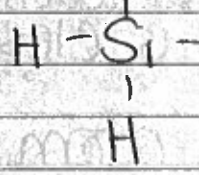
(39) a) polar b) nonpolar c) polar
d) polar a) F c) O d) I

(43) a) SiF_4 = covalent both on (R) sid
silicon tetrafluoride
(prefixes if covalent)
LaF_3 = ionic lanthanum(III) flua
(trans. metal req. romar
numerals)

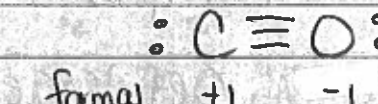
(44) b) ClF_3 = covalent chlorine
trifluoride
VF_3 = vanadium (III) fluoride
ionic

c) $SbCl_5$ = covalent antimony pentachlor
AlF_3 = ionic aluminum fluoride

(45) a) SiH_4 = 8 v.e.

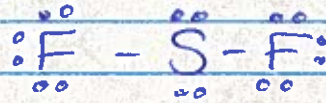


b) CO = 4+6 = 10 v.e.

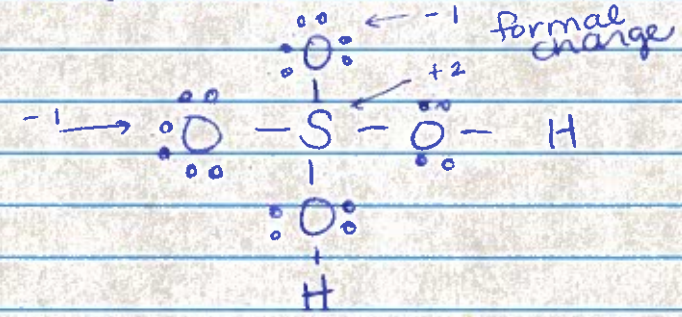


Ch 8 continued...

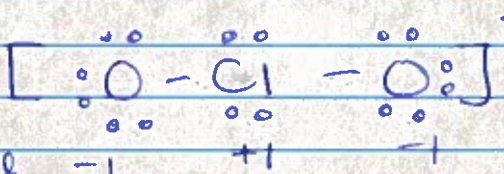
c) SF_2 $= 6 + 2 \times 7 = 20$



d) $4 \times 6 + 2 \times 1 + 6 = 32$



e)

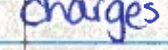


$2 \times 6 + 7 = 19 + 1$
$= 20$

f) $H - N(H) - O - H$ $\quad 3 \times 1 + 5 + 6 = 14$ V.E.

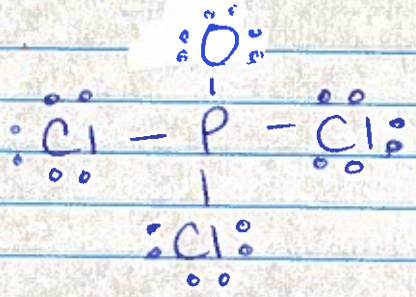
(47) a) Charge on each atom in the molecule
b) formal charges are not actual charges (actual charge adds all formal charges together)

(49) a) $[:N \equiv O:]^+$

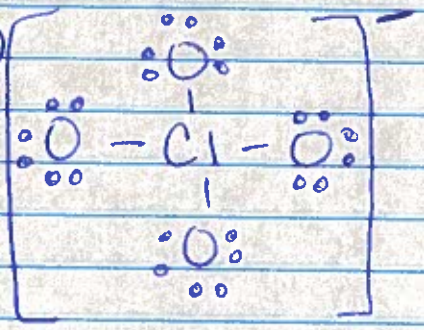


oxid # $+3 \quad -2$
more electroneg. atom gets its charge as ion
$N + -2 = +1$ solve for N

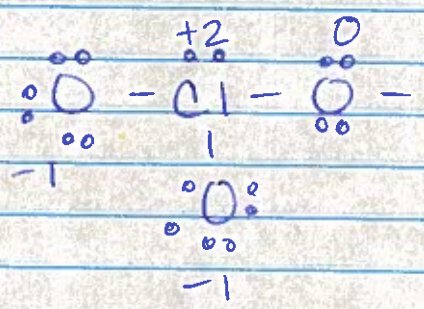
Ch8 continued...

b) 

formal charge P = +1
all Cl = 0, O = -1
oxid # Cl -1
P = +5
O = -2

c) 

formal charge O = -1
Cl = +3
oxid # O = -2
Cl = +4

d) 

oxid # O = -2
H = +1
Cl = +5

(65) a)

break	C=C	614
make	C-C	348
break	O-O	146
make	C-O x2	358 x2

$\Delta H_{rxn} = \Sigma$(bonds broken - bonds formed)
$= (614 + 146) - (348 + 2 \times 358)$
$= -304$ kJ exothermic

Ch 8 Continued...

b) break H-C 413
make C-C 348 x2
break C=C 614
make C-H 413

ΔH_{rxn} = (413 + 614) − (348x2 + 413)
(break) (make)
= -82 KJ exothermic

c) break N-Cl x6 = 200x6
make N≡N = 941
make Cl-Cl x3 = 3 x 242
(break) (make)
ΔH = (6x200) − (941 + 3x242)
= -467 KJ exothermic

(66) a) break C-H 413
break Cl-Cl 242
make C-Cl 328
make H-Cl 431
(break) (make)
ΔH = (413 + 242) − (328 + 431)
-104 KJ exothermic

b) break S-C x2 259 x2
break H-Br x2 366 x2
make C-Br x2 276 x2
make S-H x2 339 x2

ΔH = (259 x2 + 366x2) − (276x2 + 339x2)
20 KJ endothermic