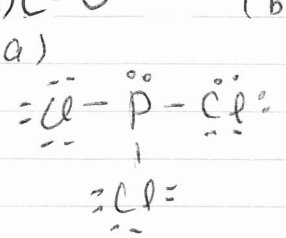
# Summary Problems

1. Sr, Ge, H, Br, Cl

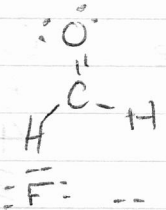
Sr → metal; Ge → semi-metal; H → small (non-metal) nucleus; Br → lower in halogens (lower Zeff); Cl → higher in halogens (highest Zeff)

2. (a) C–O (b) H–F

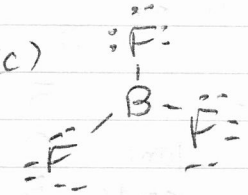
3. (a)



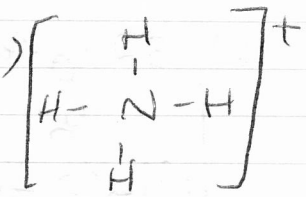
(b)



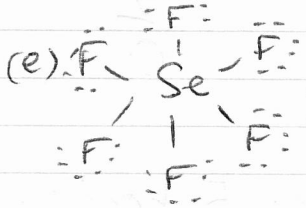
(c)



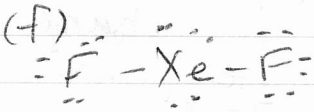
(d)



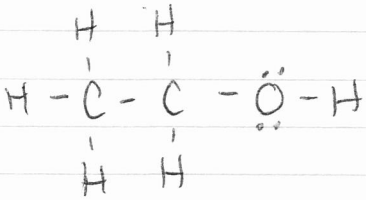
(e)

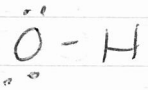


(f)



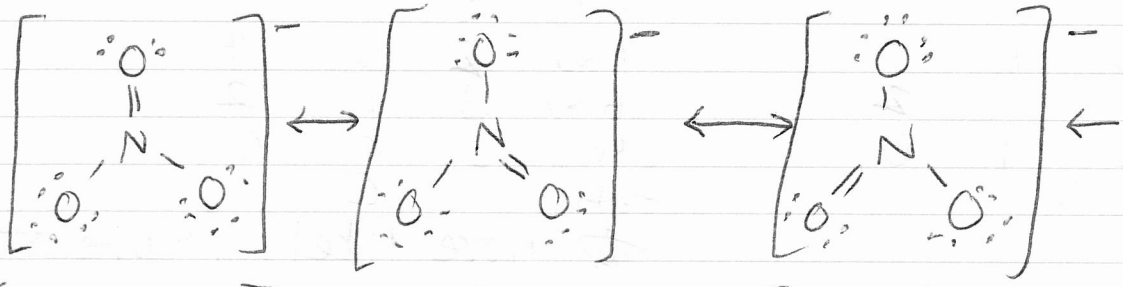
4. $CH_3CH_2OH_{(l)} + 3O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_2O_{(g)}$





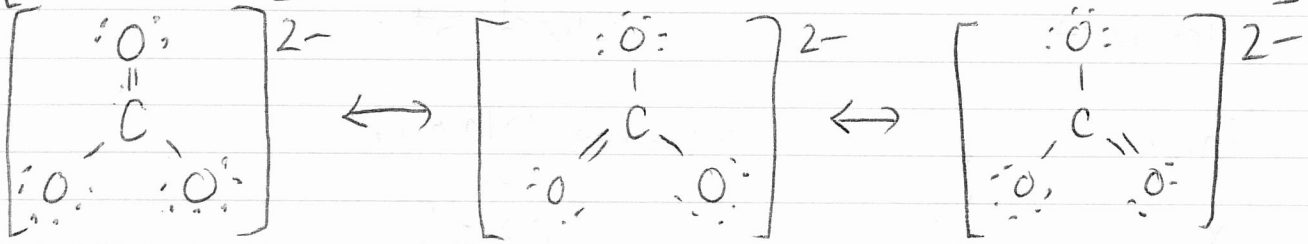
5. length (single is longest)
strength (single is weakest)
number of shared electrons

6. (a)

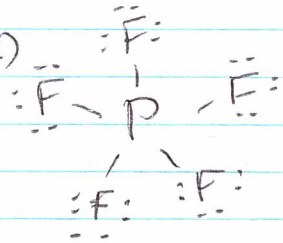


(b)

(c)

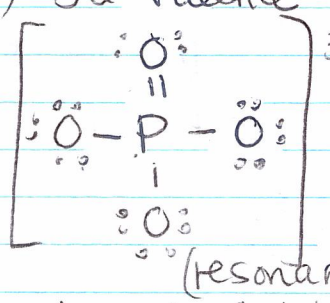


7. (a)



| | P | F |
|---|---|---|
| val | 5 | 7 |
| lone | 0 | 6 |
| bonds | 5 | 1 |
| charge | 0 | 0 |
| total | 0 | |

(b) 32 valence

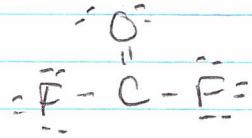


(resonance)

| | P | $3\times O_{SB}$ | $O_{DB}$ |
|---|---|---|---|
| val | 5 | 6 | 6 |
| lone | 0 | 6 | 4 |
| bonds | 5 | 1 | 2 |
| charge | 0 | -1 | 0 |
| total | | -3 | |

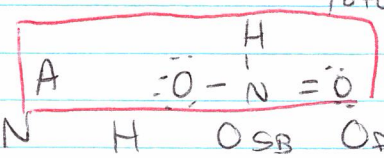
☆ most stable has P with <u>3</u> or <u>5</u> bonds.

(c)

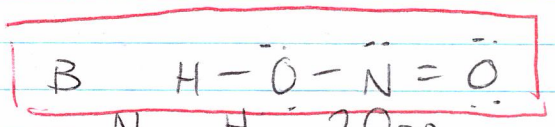


| | C | F | O |
|---|---|---|---|
| val | 4 | 7 | 6 |
| lone | 0 | 6 | 4 |
| bonds | 4 | 1 | 2 |
| charge | 0 | 0 | 0 |
| total | | 0 | |

8.



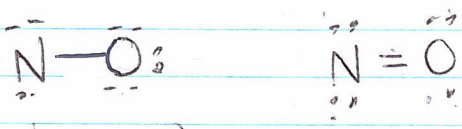
| | N | H | $O_{SB}$ | $O_{DB}$ |
|---|---|---|---|---|
| val | 5 | 1 | 6 | 6 |
| lone | 0 | 0 | 6 | 4 |
| bond | 4 | 1 | 1 | 2 |
| charge | +1 | 0 | -1 | 0 |
| total | | 0 | | |



| | N | H | $2O_{DB}$ |
|---|---|---|---|
| val | 5 | 1 | 6 |
| lone | 2 | 0 | 4 |
| bond | 3 | 1 | 2 |
| charge | 0 | 0 | 0 |
| total | | 0 | |

☆ more likely (more stable)

9.

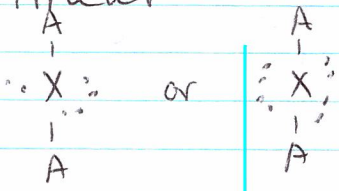


longest

:N≡O:

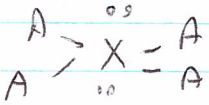
shortest.

10. linear

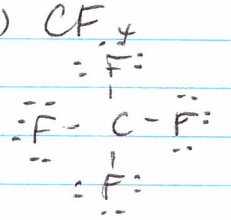


or

square planar

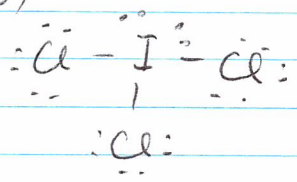


11. (a) $CF_4$



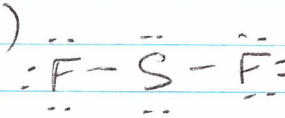
polar bonds (contains F)
shape is tetrahedral (no lone pairs)
↳ symmetric (109.5°)
molecule is non-polar

(b)



bonds are polar
shape is T-shaped (two lone pairs)
↳ asymmetric
molecule is polar.

(c)



polar bonds (contains F)
shape is bent (lone pairs)
↳ asymmetric
molecule is polar

(d) $\ddot{S}=C=\ddot{S}$

bonds are non-polar (although you would not know this without EN)
shape is linear (no lone pairs)
↳ symmetric
molecule is non-polar

12. $AB_2$

B – A – B  $CO_2$ (linear)

B – Ä – B  $SO_2$ (bent)

B – Ä – B  $H_2O$ (bent)

B – Ä – B  $XeF_2$ (linear)

also B – Ä – B but uncommon.