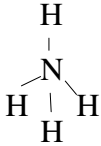
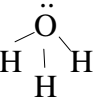
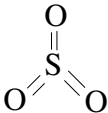


1. (*only two are given here for the sake of example; other answers may be possible*)
- +3 if phosphorus shares its $3p^3$ electrons with a more electronegative element, +5 if it *also* shares its $3s^2$ electrons
 - +2 if sulfur shares one pair of its $3p^4$ electrons with a more electronegative element, +4 if it shares both pairs
 - +1 if chlorine shares only one of its $3p^5$ electrons with a more electronegative element, +7 if it shares all of $3p^5$ and $3s^2$.
 - +2 if it loses its $4s^2$ electrons, +3 if it *also* loses one of its $3d^6$ electrons
- 2.
- False. CaS is an ionic compound (consists of ions, not molecules).
 - True. Ions are charges and therefore can carry electric current.
 - False. When P_4O_{10} reacts with water (dissolves) it forms oxyanions (negative) and hydrogen ions (positive). These can flow to carry charge.
- 3.
- The ability of an atom to attract electrons towards itself in a bond.
 - MgO is ionic, meaning the electronegativity difference between Mg and O is so significant that oxygen atoms completely gain the electrons and the magnesium atoms lose them. This leaves the atoms oppositely charged and their strong opposite charge attracts them strongly, meaning they are hard to break apart.
 - The charge of Mg ions is double that of Na ions, and the charge of O ions is twice that of Cl. More charges are therefore attracting the atoms together in MgO so its melting point will be higher.
 - The electrons in Mg are free to move in any state, allowing electricity to conduct. The ions in MgO however are only free to move when molten or dissolved.
 - SiO_2 is a covalent network whereas CO_2 is molecular. Therefore melting SiO_2 requires breaking very strong primary bonds but CO_2 is only held by the much weaker secondary forces.
- 4.
- A bond in which the electrons are more strongly attracted to one atom than the other, leaving the two ends of the bond relatively oppositely charged.
 - CF_4 is a tetrahedral shape, meaning that the total direction of all the polar bonds cancels out, meaning the molecule is net non-polar.
 - As the molar mass increases, the number of atoms and electrons increases. The more of these there are, the more opportunity for dispersion forces to act between the molecules, meaning stronger interaction.
- 5.
- Tetrahedral

 - Trigonal pyramid

 - Trigonal planar

- 6.
- A: $1s^2 2s^2 2p^5$
 B: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
 C: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$
 - (i) Ionic (ii) Ionic (iii) Metallic
- 7.
- Intermolecular interaction between molecules with polar bonds consisting of hydrogen and usually either fluorine, oxygen or nitrogen.
 - H_2O would, since the electronegativity difference is higher and therefore the bond more polar, so the attraction between molecules will be stronger.