## I am able to:

- 1 Describe how positive and negative ions are formed.
- 2 Give the formulae of the ions formed by the following elements: Li Ba Al Br O N
- 3 State the formulae (with charges) of the following ions: nitrate sulphate hydroxide ammonium carbonate hydrogencarbonate phosphate(V)
- 4 Work out the formulae of the following ionic compounds:

Lithium fluoride	Sodium hydrogencarbonate	Iron(II) phosphate
magnesium chloride	Calcium nitrate	Sodium carbonate
ammonium sulfate	Barium hydroxide	Copper(II) nitrate

5 Classify each of the following as having mainly ionic or mainly covalent bonding:

CO<sub>2</sub> CaS PCI<sub>3</sub> OF<sub>2</sub> MgO

- 6 Explain what is meant by *ionic bonding*.
- 7 Describe the structure of ionic compounds
- 8 Explain why ionic compounds
  - have high melting point,
  - are non-volatile
  - are often soluble in water
  - do not conduct electricity when solid
  - conduct electricity when molten or in aqueous solution
- 9 Explain what is meant by a covalent bond
- 10 Draw Lewis structures for:

O <sub>2</sub>	C <sub>2</sub> H <sub>2</sub>	$N_2$
HCN	NH <sub>4</sub> +	$N_2H_4$
CO <sub>2</sub>	C <sub>2</sub> H <sub>4</sub>	CO <sub>3</sub> <sup>2-</sup>

- 11 State and explain the differences in bond length and bond energy in
  - C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>2</sub>
  - N<sub>2</sub>, N<sub>2</sub>H<sub>4</sub> and N<sub>2</sub>H<sub>2</sub>
- 12 Understand what is unusual about the Lewis structures for BCl<sub>3</sub> and BeCl<sub>2</sub>
- 13 Explain what is meant by the term coordinate covalent bond
- 14 Explain which of the following contain coordinate covalent bonds

O<sub>3</sub> CO PCl<sub>3</sub> NH<sub>4</sub><sup>+</sup> NO<sub>2</sub><sup>+</sup>

- 15 Explain the valence shell electron pair repulsion theory for predicting shapes of molecules.
- 16 Predict the electron domain geometry, shape and bond angles of:

CH <sub>4</sub>	H <sub>2</sub> O	C <sub>2</sub> H <sub>4</sub>	Н₃О⁺	CO <sub>3</sub> <sup>2-</sup>	O <sub>3</sub>
NH <sub>3</sub>	CO <sub>2</sub>	C <sub>2</sub> H <sub>2</sub>	NH <sub>4</sub> +	BF <sub>3</sub>	PCl <sub>3</sub>

ID CI	Dandina	Davisias	^
IB OL	Bonaina	Revision	_

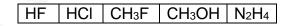
- 17 Explain what is meant by *electronegativity*
- 18 State and explain which of the following bonds is most polar: H-C H-Cl H-F
- 19 Explain which of the following molecules is/are polar:

$N_2$	NH <sub>3</sub>	PCI <sub>3</sub>
CO	CO <sub>2</sub>	CH <sub>2</sub> Cl <sub>2</sub>

- 20 Explain what is meant by a resonance structure
- 21 Draw two resonance structures for O<sub>3</sub>.
- 22 Draw resonance structures for each of the following

CO<sub>3</sub><sup>2</sup>- C<sub>6</sub>H<sub>6</sub> CH<sub>3</sub>COO NO<sub>2</sub> NO<sub>3</sub>-

- 23 Explain the origin of London (dispersion) forces.
- 24 Explain what van der Waals forces are.
- For each of the following pairs, explain in terms of intermolecular forces, which has the higher boiling point.
  - Cl<sub>2</sub> or Br<sub>2</sub>
  - CH<sub>3</sub>CI or CH<sub>3</sub>Br
  - CH<sub>3</sub>CH<sub>2</sub>CH<sub>3</sub> or CH<sub>3</sub>OCH<sub>3</sub>
  - CH<sub>3</sub>CH<sub>2</sub>OH or CH<sub>3</sub>OCH<sub>3</sub>
  - NH<sub>3</sub> or PH<sub>3</sub>
- 26 Draw a diagram to show the hydrogen bonding between molecules of water.
- 27 Explain which of the following will have hydrogen bonding between molecules



- 28 Explain why covalent molecular compounds:
  - have low melting and boiling points
  - are volatile
  - do not conduct electricity when liquid
  - tend to be soluble in organic solvents
- 29 Explain which of the following chlorides will have the lowest boiling point

NaCl MgCl<sub>2</sub> SiCl<sub>4</sub>

30 Explain which of the following chlorides will be the best conductor of electricity in the liquid state

NaCl SiCl<sub>4</sub> SCl<sub>2</sub>

- 31 Explain the relative solubilities of ionic and covalent substances in polar and non-polar solvents.
- 32 Describe the structure and bonding of
  - Diamond
  - Graphite
  - o Graphene
  - o C<sub>60</sub> buckminsterfullerene

- 33 Describe the structure and bonding of silicon dioxide
- 34 Explain why diamond has a much higher melting/boiling point than C<sub>60</sub> buckminsterfullerene
- Explain why graphite and graphene are better conductors of electricity than diamond and C<sub>60</sub> fullerene.
- 36 Explain what is meant by *metallic bonding*.
- 37 Explain why metals conduct electricity and are malleable.
- 38 Explain why magnesium has a higher melting point than sodium
- 39 Explain what an alloy is.
- 40 Explain why alloys tend to be stronger than pure metals.