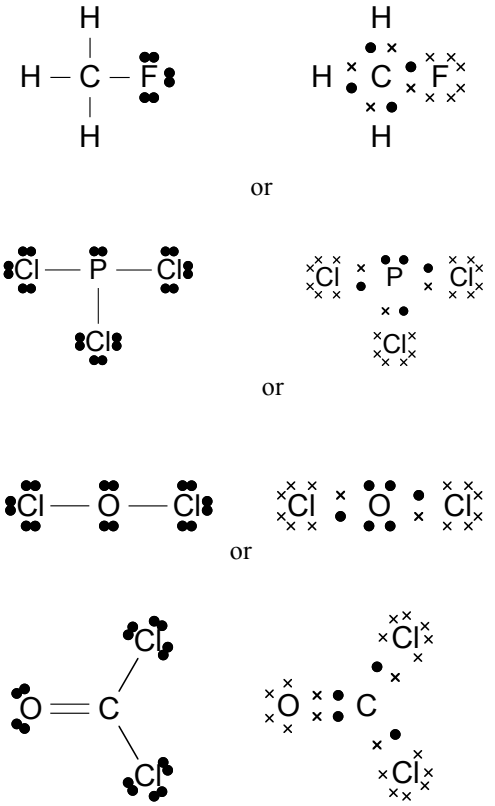
Assessment Schedule – 2008

Chemistry: Describe atomic structure and bonding (90172)

Evidence Statement

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
ONE	Oxygen has the electron arrangement 2,6. Aluminium has the electron arrangement 2,8,3. To form an ion, oxygen gains 2 electrons (filling its outer / valence shell) and aluminium loses 3 electrons (to empty its outer / valence shell). Both ions end up with the same electron arrangement 2,8.	Correctly describes the electron arrangement for oxygen AND aluminium atoms. **OR** Oxygen atom AND ion described correctly **OR** Aluminium atom AND ion described correctly **OR** Oxide AND aluminium ions described correctly. Must say gain 2 / lose 3 electrons.	Correctly describes the electron arrangement for oxygen and aluminium atoms and ions. **AND** Explains how each atom forms an ion (gains 2, loses 3 electrons) **AND** Correctly identifies the electron arrangement for oxide and aluminium ions.	
TWO (a) (b)	^{2}H is made up of 1 proton, 1 neutron and 1 electron. ^{3}H is made up of 1 proton, 2 neutrons and 1 electron. Physical differences: Different masses, ^{3}H is heavier than ^{2}H as ^{3}H has an M of 3 and ^{2}H has an M of 2 / ^{3}H has one more neutron Chemical similarities They react in the same way as both isotopes have the same number of electrons (eg both isotopes form the H^{+} ion). Other chemical / physical similarities / differences must have explanation as well. Density Rate of diffusion Physical similarities Both gases Same solubility Same boiling point / melting point.	Correctly describes ^{2}H and ^{3}H. **OR** Correctly identifies one physical AND one chemical difference / similarity. **OR** Correctly explains one chemical OR one physical similarity or difference.	Correctly describes ^{2}H and ^{3}H AND correctly explains one physical OR one chemical similarity / difference. **OR** Correctly explains one chemical AND one physical similarity / difference.	

THREE		Any TWO correct.	Achievement plus $COCl_2$ correct. To gain Merit all diagrams must follow convention with electrons shown as either dots or crosses and clearly paired. Bonding electron pairs shown as dots or crosses should not be circled.	
FOUR (a) (b)	Water is a <u>molecule</u> (made up of covalently bonded atoms). The attractive forces between the molecules are weak intermolecular forces Part A: • Separation, close • Energy, increasing • Motion, can move past each other • Attractive forces (as above) weak intermolecular. Part B: • Separation, increasing distance between molecules • Energy, breaking the intermolecular forces • Motion, gas particles move faster • Attractive forces, bonds broken. Here the liquid water changes to gaseous water. The molecules have the same amount of kinetic energy and motion, but separation is increasing.	Correctly identifies water particles as molecules AND that there are weak intermolecular forces between the molecules **OR** Interprets graph correctly by describing 2 of the 4 points for Part A AND Part B.	Correctly identifies water particles as molecules AND that there are intermolecular forces between the molecules **AND** Interprets graph correctly by **EITHER** Explaining what is happening in Part A **OR** Explaining what is happening in Part B (2 of the 4 points) **OR** Explaining 3 of 4 points for Part A and Part B.	Correctly identifies water particles as molecules AND that there are intermolecular forces between the molecules **AND** Interprets graph correctly by explaining what is happening in Part A **AND** Explaining what is happening in Part B. The comparison between Part A and Part B must explain that while the temperature is constant, energy added in B is breaking the intermolecular bonds.

FIVE	Sodium chloride is more likely to have the higher melting point. Sodium chloride is an ionic compound. (It is made up of metal and non-metal ions, so it will have ionic bonds.) Ammonia is a (covalent) molecule with weak intermolecular forces between the molecules. (It is made up of non-metal atoms, so it will have covalent bonds.) To melt sodium chloride, these very strong ionic bonds need to be broken. This requires a lot of energy, so sodium chloride will have a high melting point. To melt ammonia, the weak intermolecular forces need to be broken. This requires little energy, so ammonia will have a lower melting point than sodium chloride.	Identifies NaCl as the compound with the higher melting point **AND** Describes NaCl as an ionic compound **OR** Identifies NH_3 as the compound with the lower melting point **AND** Describes NH_3 as a covalently bonded molecule.	Identifies NaCl as the compound with the higher melting point **AND** Explains that NaCl is made up of ions **OR** NH_3 is made up of molecules, **AND** Links melting point to the type of bonding in ONE compound. (Eg: NaCl has strong ionic bonds which need a lot of energy to break OR NH_3 has weak intermolecular forces between molecules needing little energy to break).	Identifies NaCl as the compound with the higher melting point **AND** Explains that NaCl is made up of ions **AND** NH_3 is made up of molecules. **AND** Links MP to the type of bonding in BOTH compounds. (Eg: NaCl has strong ionic bonds which take a lot of energy to break so NaCl will have a high melting point AND NH_3 has (covalent bonds and) weak intermolecular forces between molecules which take a small amount of energy to break, so NH_3 will have the lower melting point).

Judgement Statement – 2008

Achievement	Achievement with Merit	Achievement with Excellence
A total of THREE opportunities answered at Achievement level or higher. (Must include an answer from Q4 or Q5.) 3 × A	A total of THREE opportunities answered at Merit level or higher. 3 × M	A total of FOUR opportunities answered including ONE at Excellence level and THREE at Merit level or higher. 1 × E + 3 × M