

Nanyang Girls' High School
Secondary Three Chemistry (IP) – Mid Year Examination – 2016
Mark Scheme

Section A

Q1	C	Q2	A	Q3	B	Q4	D	Q5	C
Q6	A	Q7	B	Q8	C	Q9	A	Q10	C
Q11	D	Q12	A	Q13	A	Q14	A	Q15	B
Q16	D	Q17	B	Q18	C	Q19	C	Q20	D

Note: The correct chemical formula **should be** accepted when the question asks for the name of a chemical. The name of a chemical is **should not** be accepted when the question asks for the formula. If the question does not specify whether the name or formula of a chemical should be given, then either is acceptable.

Section B

B1.

- (a) Diffusion. [1]
- (b) Pb^{2+} / lead(II) ion has a higher relative atomic mass than I^- / iodide ion and therefore diffuses / moves / travels more slowly. [1]
- or
- I^- / iodide ion has a lower relative atomic mass than Pb^{2+} / lead(II) ion and therefore diffuses / moves / travels faster. [1]
- (c) The precipitate would be slightly to the right of the centre line / closer to Y. [1]
- or
- The precipitate would form more quickly / in a shorter time. [1]
- (d) The precipitate will take longer than 90 seconds to form. [1]

Total [4]

B2.

- (a) The solutions are very pale in colour / colourless. [1]
- (b) Sn^{2+} , Cu^{2+} and Pb^{2+} . [1]
- (c) No. Electrode B contains Ni^{2+} which is not present in electrode A. [1]
- or
- No. Electrode A does not contain Ni^{2+} which is present in electrode B. [1]
- (d) Spot should be drawn at 9 cm. [1]

Total [4]

B3.

- (a) 40.0 cm³ [1]
- (b) After the sodium hydroxide has neutralised the acid, the pH increases above 7. [1]
- (c) The initial / starting pH of the acidic solution is 3, which is typical for a weak acid. [1]
- (d)
- (i) Methyl orange, litmus and phenolphthalein. At least two indicators. [1]
- (ii) Phenolphthalein only. [1]
- (e) $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$ must have state symbols. [1]

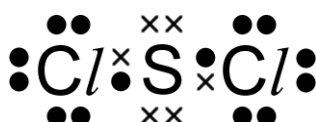
Total [6]**B4.**

- (a) Cu^{2+} / copper(II) ion, Fe^{2+} / iron(II) ion, Fe^{3+} / iron(III) ion. [1]
- (b) Silver chloride. Accept AgCl (formula must be correct). [1]
- (c) Lead(II) chloride / PbCl_2 is insoluble in water. [1]
- (d) Aluminium hydroxide. Accept $\text{Al}(\text{OH})_3$ (formula must be correct). [1]
- (e) Al^{3+} [1]
 Cl^- [1]
- (f) $\text{AlCl}_3(\text{aq}) + 3\text{NaOH}(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{s}) + 3\text{NaCl}(\text{aq})$ [1]
Note: Question asks for state symbols – no mark awarded if state symbols not given.
- (g) $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$ must have state symbols. [1]

Total [8]**B5.**

(a)

(i)

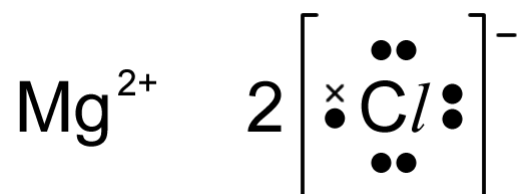


Covalent bonding [1] Noble gas electronic configurations [1]

- (ii) Sulfur dichloride has a simple covalent structure / is a simple covalent compound. There are weak intermolecular forces of attraction / van der Waal's forces of attraction between the molecules [1] which only require a small amount of energy / low temperature to weaken. [1]

(b)

(i)



Ionic bonding [1] Noble gas electronic configurations [1]

- (ii) Magnesium chloride has a giant ionic lattice. All of the ions are held in a fixed position by strong electrostatic forces of attraction in the solid state [1] and are unable to conduct electricity. Only when liquid / molten are ions free to move / mobile to the electrode of opposite charge. [1]

Total [8]

Section C

C1.

- (a) Pure dry oxalic acid does not contain H^+ / hydrogen ions in solution. [1]
- (b) A weak acid does not fully ionise, when dissolved in water, to produce H^+ ions / hydrogen ions (as the only positive ion). [1]
- (c)
- (i) $\text{H}_2\text{C}_2\text{O}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Na}_2\text{C}_2\text{O}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
Ignore state symbols. [1]
- (ii) Soluble. All sodium salts are soluble in water. [1]
- (d)
- (i) Any soluble calcium salt, e.g. calcium chloride or calcium nitrate. [1]
- (ii) Mix the aqueous reagents together.
Filter the mixture to obtain the precipitate / residue. [1]
Wash the residue with (cold) distilled water. [1]
Dry the residue by pressing between layers of filter paper. [1]
- (e)
- (i) K_2SO_4 [1]
- (ii) 10 [1]

Total [10]