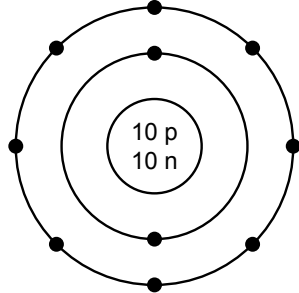


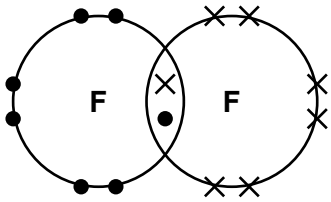
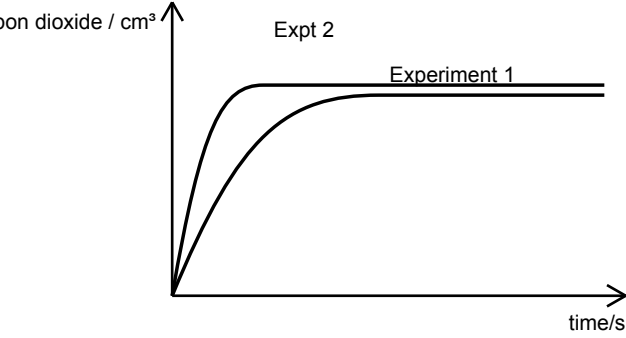
Science (Chemistry) 5086/5088 – Set III
Marking Scheme

Paper 1

1	2	3	4	5
A	B	C	D	D
6	7	8	9	10
B	D	C	A	A
11	12	13	14	15
C	A	C	B	D
16	17	18	19	20
B	D	A	A	C

Paper 3 Section A

1	(a) Water / carbon monoxide (b) sulfur trioxide (c) aqueous ammonia (d) carbon monoxide / potassium iodide / bromine (e) potassium manganate(VII) (f) carbon monoxide / water	[1] each max [6]
2	(a) (i) Atoms of the same element with same number of proton but different number of neutrons (b) (i) $^{14}_6\text{C}$ or $^{12}_6\text{C}$ (ii) sodium-11 or carbon-14 (iii) magnesium-24 (c) 	[1] [1] [1] [1] [1] for correct electron configuration [1] for correct number of p and n

3	(a) Halogen (b) Black solid (c) react with metal / able to displace less reactive halides from its salt (accept any other reasonable chemical properties, reject physical properties like coloured, diatomic) (d) Chlorine is a gas while bromine is a liquid at room temperature and pressure. / Chlorine molecules are far apart while bromine molecules are closely packed in room temperature and pressure. (reject: Molar mass of bromine is greater than chlorine) (e) (i) 2 atoms in a molecule / chemically combined/joined together (ii) 	[1] [1] [1] [1] [1] [1] 2 electron shared [1] 6 valence electron each
4	(a) A: iron B: hydrogen gas C: iron(II) chloride D: oxygen / air E: iron(II) hydroxide (b) reddish brown solid / dirty green solid / brown yellow solid (c) $4\text{Fe} + 3\text{O}_2 + 6\text{H}_2\text{O} \rightarrow 4\text{Fe}(\text{OH})_3$ $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$ $\text{FeCl}_2 + 2\text{NaOH} \rightarrow \text{Fe}(\text{OH})_2 + 2\text{NaCl}$ $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$	[1] [1] [1] [1] [1] [1] [1] correct formula [1] balanced eqn
5	(a) (i) $\text{H}_2\text{SO}_4(\text{aq}) + \text{CuCO}_3(\text{s}) \rightarrow \text{CuSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$ (ii) No of mole of acid: $0.025 \text{ dm}^3 \times 1 \text{ mol/dm}^3 = \mathbf{0.025 \text{ mol}}$ [M1] mole ratio $\text{H}_2\text{SO}_4 : \text{CO}_2$ 1 : 1 0.025 : 0.025 mol vol of CO_2 : $0.025 \times 24 \text{ dm}^3 = \mathbf{0.6 \text{ dm}^3}$ [A1] (b) [1] steeper gradient, [1] same yield  (c) 2.0 mol/dm³	[1] [2] [2] [1]

6	(a) The refinery use process 1 as it produce higher percentage of ethene that it sells. It uses also process 2 as it produce higher percentage of C₅ to C₈ hydrocarbons and also relatively higher amount of ethene it sells. (accept any reasonable answer that justify the need for both processes) (b) (i) C₃H₆ (ii) $\begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{C} & = & \text{C} \\ & & \\ \text{H} & & \text{H} \end{array}$ $\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array}$ (c) Fermentation [1] Add yeast to glucose solution. [1] (accept word equation / another reasonable expression of answer like add yeast to grape juice/ apple juice/etc)	[1] [1] [2] [2]									
7	(a) it is toxic as it combines with haemoglobin in red blood cell irreversibly preventing it from carrying oxygen to other part of the body. (b) (i) H₂O (ii) <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">element</th><th style="padding: 5px;">oxidation state before reaction</th><th style="padding: 5px;">oxidation state after the reaction</th></tr> </thead> <tbody> <tr> <td style="padding: 5px;">palladium</td><td style="padding: 5px;">+2</td><td style="padding: 5px;">0</td></tr> <tr> <td style="padding: 5px;">carbon</td><td style="padding: 5px;">+2</td><td style="padding: 5px;">+4</td></tr> </tbody> </table> (iii) reduced[1], as its oxidation state decreased[1] from +2 in PdCl₂ to 0 in Pd.	element	oxidation state before reaction	oxidation state after the reaction	palladium	+2	0	carbon	+2	+4	[1] [1] [1] [1] [2]
element	oxidation state before reaction	oxidation state after the reaction									
palladium	+2	0									
carbon	+2	+4									
8	(a) Relative atomic mass is the average mass of an atom compared to the mass of 1/12 of carbon-12 atom. (b) Lithium atom: 2.1 Oxygen atom: 2.6 (c) <insert dot and cross of Li₂O> [1] for correct electronic configuration, [1] for correct number of ions and charge $\left[\begin{array}{c} \bigcirc \\ \times \\ \text{Li} \\ \times \end{array} \right]^+$ $\left[\begin{array}{c} \bigcirc \\ \bullet \\ \text{O} \\ \bullet \end{array} \right]^{2-}$ $\left[\begin{array}{c} \bigcirc \\ \times \\ \text{Li} \\ \times \end{array} \right]^+$ (d) basic oxide[1] (e) There is free mobile lithium and oxide ions in molten state. [1] In solid state, all lithium and oxide ions are vibrating about fixed position in the crystal lattice, there is no free mobile charge carrier. [1] (f) Oxygen gas is a simple covalent molecule [1]; little amount of energy is needed to overcome weak intermolecular attraction [1] between oxygen molecules. So it has low melting and boiling point and exist as gas at room condition.	[1] [1] [1] [2] [1] [2] [2]									

Section B

9	(a) W: combustion / burning X: respiration Y: photosynthesis (b) (i) Polymer is a very large organic molecule built up from many small unit called monomer. (ii) draw propene $\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{C} = & \text{C} - & \text{C} - \text{H} \\ & & \\ \text{H} & & \text{H} \end{array}$ (iii) land pollution / water pollution / air pollution (c) (i) Carbon dioxide may be emitted during transport/collection/melting of plastic/ use of machinery to shred and grind plastic. (Accept any reasonable answers) (ii) By cracking using high temperature and in the presence of catalysts (iii) Recycling poly(propene) can cost more than disposal as there will be additional cost of sorting , cleaning for chemical / physical recycling. Recycled plastics may be of lower value, hard for recycling business to survive.	[1] [1] [1] [1] [1] [1] [1] [1]
10	(a) Magnesium ethanoate + water (b) (i) All magnesium oxide dissolved/ disappeared. (ii) Green universal indicator turns yellow/orange. (c) (i) Add vinegar drop by drop using burette [1] Stop when the drop dissolves all magnesium oxide. [1] (accept any other possible experiment set up to add exact volume of vinegar. Eg: use of indicator or weigh the MgO and calculate exact volume of vinegar) (ii) Colour of UI: green Explanation: Exact volume of acid used to react with MgO to form neutral salt solution. / All acid added has been neutralised by MgO. (d) (i) <insert full structural formula of ethanoic acid> $\begin{array}{c} \text{H} & & \text{O} \\ & & \\ \text{H} - \text{C} - & \text{C} & \\ & & \\ \text{H} & & \text{O} \\ & & \\ & & \text{H} \end{array}$ (ii) name: propanoic acid chemical formula: C₂H₅COOH / C₃H₆O₂	[1] [1] [1] [2] [1] [1] [1] [1] [1] [1]