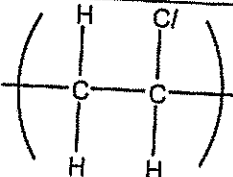
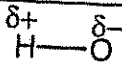
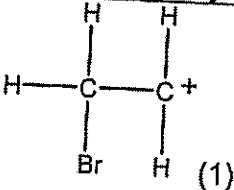
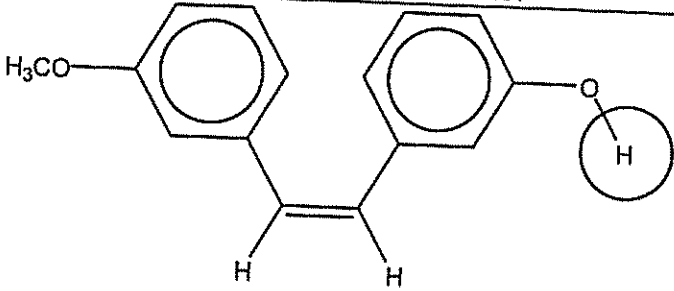
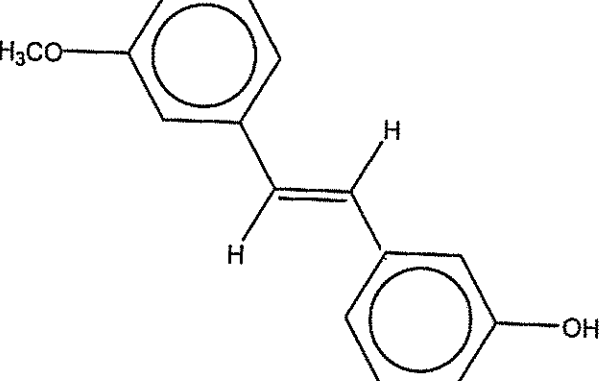
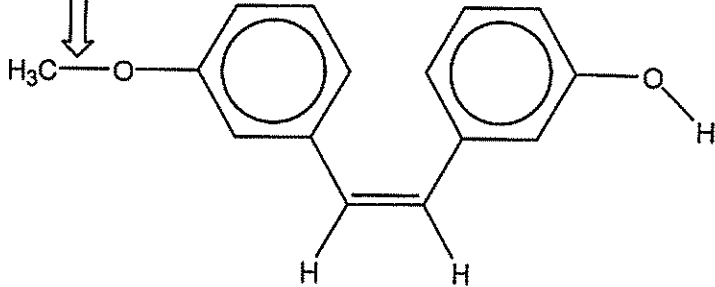


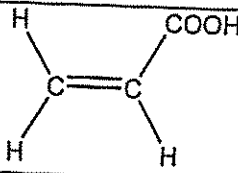
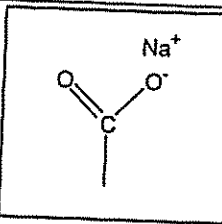

Question	Expected answers	Marks
1 (a) (i)	chloroethene (1). <i>Ignore numbers if 1 or 2.</i>	1
1 (a) (ii)	Softens / changes shape / remoulded (1); when heated/allow when it is melted / no cross-links (1).	2
1 (a) (iii)	 allow $-\text{CH}_2-\text{CHCl}-$ (1).	1
1 (b)	 (uses numbers to identify) correct bond (1); partial charges correct (1).	2
1 (c) (i)	Acidified/sulphuric acid (1) allow any mineral acid/ $\text{H}^+$ ; (potassium) dichromate/ $\text{Cr}_2\text{O}_7^{2-}$ (1).	2
1 (c) (ii)	condensing vapours (1); returning liquid to flask /vapours not allowed to escape (1).	2
1 (c) (iii)	$1700-1725 \text{ cm}^{-1}$ (1); $\text{C}=\text{O}$ (1).	2
1 (d)	Elimination (1).	1
1 (e) (i)	Bromine molecule is polarised (1); by the $\text{C}=\text{C}$ bond/electrophilic attraction/electrons/negative charge ignore <i>electronegativity</i> (1).	2
1 (e) (ii)	 (1)	1
<b>Total mark</b>		<b>16</b>

Question	Expected answers	Marks
2 (a)	<p>Any 5 points from:  <i>CO<sub>2</sub> absorbs</i> (1);  <i>infrared radiation/light</i> (1);  <i>emitted</i>/radiated from/given off from the Earth (1);  <i>molecules/bonds vibrate</i> (1);            molecules have greater            (kinetic) energy/faster vibrations (1);            links energy to temperature/hotter/warmer (1);</p> <p>QWC            1 mark for two sentences / 2 bullet points including correct use of two of the words above in <i>italics</i> used correctly.</p>	6
2 (b) (i)	<p>There are two alternative ways to tackle this question:            Increase in [CO<sub>2</sub>] /decrease in [HCO<sub>3</sub><sup>-</sup>] (1 mark for using concentrations);            then any 3 points from 4:            gas moves equilibrium position in 2.1 to right/equilibrium in 2.2 to right (1);            this increase in CO<sub>2</sub>(aq) causes/ decrease in CO<sub>2</sub>(aq) causes (1);            equilib. pos. in 2.2 to move to right/ equilib. pos. in 2.1 to move to right (1);            and more ions will form/more CO<sub>2</sub> dissolves <i>or</i> thus CO<sub>2</sub> gas is continually removed (1).</p> <p>QWC            At least two readable and clear sentences with no more than one spelling, punctuation or grammatical error (1).</p>	5
2 (b) (ii)	Hydrogen ions are formed (1).	1
2 (c)	<p>Any two sensible linked points: e.g.            extract CO<sub>2</sub> gas (1) and bury as liquid (1);            encourage photosynthesis (1) by plants, or by imitating plants (1);            use the right fuel for the job (1) <i>example</i> (1);            use fewer 'vehicles'/less power generation (1) to reduce emissions/use less fossil fuel (1).</p>	2
2 (d) (i)	Can with gas flow in and out on opposite sides (1); Granular/mesh absorbent/thin tube coated (1); correct labels (1).	3
2 (d) (ii)	$\text{Ca(OH)}_2(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l})$ <p>1 mark for correct equation;            1 mark for state symbols correct.</p>	2
2 (e)	H <sup>+</sup> / H <sub>3</sub> O <sup>+</sup> and CO <sub>3</sub> <sup>2-</sup> (allow carbonate or CO <sub>3</sub> <sup>-</sup> ) 1 mark for each ion correct.	2
2 (f) (i)	1 mark for each one correct including sign: -1, -2, -2, 0 allow sign after number.	4
2 (f) (ii)	O in sodium peroxide <i>alone</i> (1) has its oxidation state increased and decreased (1) <i>these two are linked</i> ; The second mark can be gained for linking oxidation state change correctly to oxidation/reduction.	2
2 (f) (iii)	Oxygen is formed (1).	1
<b>Total mark</b>		<b>28</b>



Question	Expected answers	Marks
4 (a)	<p>Any 2 points:</p> <p>Check that it is acceptably safe / not toxic or harmful to humans (1);            synthesis (1);            structural identification (1);            physical properties (1);            stability (1);            how it is absorbed by the body (1);            how it is excreted (1);            biological testing (1);            formulation of dosage (1).</p>	2
4 (b)	Alter structure by changing substituent/side groups (1). <i>May be specific e.g. add -OH group to make it soluble.</i>	1
4 (c) (i)	 <p>(1).</p>	1
4 (c) (ii)	Phenol/hydroxyl/enol (1).	1
4 (d) (i)	 <p>(1).</p>	1
4 (d) (ii)	<p>Addition of hydrogen to C=C double bond (1);  <i>no longer is there restricted rotation/groups in varied arrangements</i> (1);  <i>about the C-C single bond or the molecule is now saturated/only has single bonds</i> (1).            ORA</p>	3
4 (e) (i)	Positive (1) ion (1).	2
4 (e) (ii)	CH <sub>3</sub> <i>ignore charge</i> (1).	1
4 (e) (iii)	(It represents the) most abundant (particle) (1)	1

4 (e) (iv)	<p data-bbox="331 141 491 174">Bond broken</p>  <p data-bbox="1045 499 1085 533">(1)</p> <p data-bbox="319 521 1316 562">The mass difference between the two peaks is 15, hence a CH<sub>3</sub> is lost (1)</p>	2
<b>Total mark</b>		<b>15</b>

Question	Expected answers	Marks
5 (a)	 (1).	1
5 (b)	 and 	3
5 (c)	<p><i>H<sub>2</sub>O correct (1); structure of salt (1); correct charges (1).</i>  <i>Do not allow C-NaO.</i></p> <p>Moles of hydroxide = <math>(35.0/1000) \times 0.10 = (3.5 \times 10^{-3})</math>  <i>mark is for Concentration X Volume so may have 3.5 (1);</i>            Moles of carboxylic acid groups = <math>3.5 \times 10^{-3}</math> (1);</p>	2
5 (d) (i)	<p><u>Covalent</u> bond (1);            Between 2 polymer chains <i>or</i> linking polymer chains (1).</p>	2
5 (d) (ii)	Make them stronger (1)	1
<b>Total mark</b>		<b>9</b>