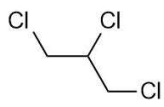
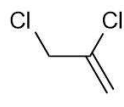
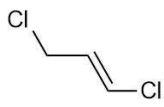
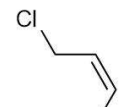
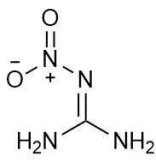
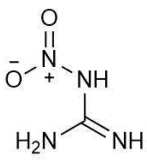
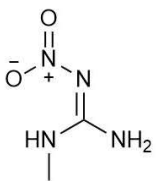
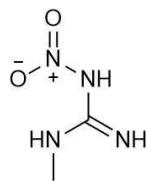
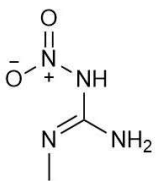
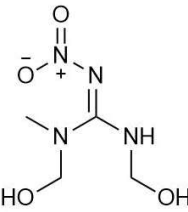
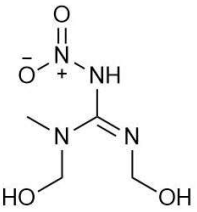
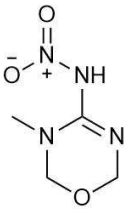
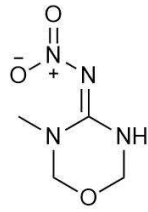
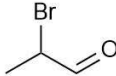
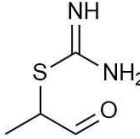
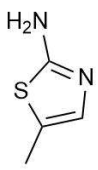
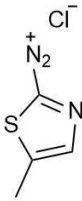
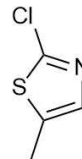
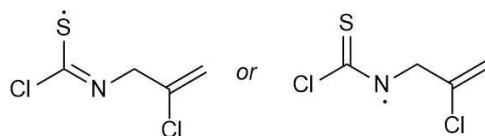


4.	This question is about bees and Brexit	Mark
(a)	$C_8H_{10}ClN_5O_3S$	<input checked="" type="checkbox"/>
(b)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><b>A</b></p>  </div> <div style="text-align: center;"> <p><b>B</b></p>  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p><b>B'</b></p>  </div> <div style="text-align: center;"> <p><b>B''</b></p>  </div> </div> <p><i>One mark for each correct structure. If B' and B'' are drawn the wrong way around then one mark out of two is scored for B' and B'' combined. No ECF can be applied.</i></p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
(c)	$S=C=N^-$ <i>The correct shape is not required for the mark.</i>	<input checked="" type="checkbox"/>
(d)	$O=N^+=O$ Linear <i>The shape must be stated as linear or clearly indicated as linear from the diagram for the mark.</i>	<input checked="" type="checkbox"/>
(e)	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p><b>E</b></p>  </div> <div style="text-align: center;"> <p>or</p>  </div> <div style="text-align: center;"> <p><b>F</b></p>  </div> <div style="text-align: center;"> <p>or</p>  </div> <div style="text-align: center;"> <p>or</p>  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p><b>G</b></p>  </div> <div style="text-align: center;"> <p>or</p>  </div> <div style="text-align: center;"> <p><b>H</b></p>  </div> <div style="text-align: center;"> <p>or</p>  </div> </div> <p><i>One mark for E, two marks for F, two marks for G, and one mark for H. For F and G no partial credit is given – structures must be fully correct for the two marks. ECF can be awarded for F based on E. ECF can be awarded for G based on F only if G is consistent with molecular formula. No ECF for H as H can be worked to backwards from product.</i></p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

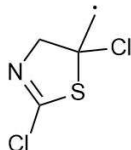
(f)	<p style="text-align: center;"><b>I</b></p>  <p style="text-align: center;"><b>J</b></p>  <p>One mark for <b>I</b>, two marks for <b>J</b>. No partial credit is given for <b>J</b> – structure must be fully correct for the two marks. ECF can be awarded for <b>J</b> based on <b>I</b> only if <b>J</b> is consistent with molecular formula.</p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
(g)	<p style="text-align: center;"><b>K</b></p>  <p>No partial credit is given for <b>K</b> – structure must be fully correct for the two marks. ECF can be awarded for <b>K</b> based on <b>J</b> only if <b>K</b> is consistent with molecular formula.</p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
(h)	<p style="text-align: center;"><b>L</b></p>  <p style="text-align: center;"><b>M</b></p>  <p>Two marks for <b>L</b>, one mark for <b>M</b>. No partial credit is given for <b>L</b> – structure must be fully correct for the two marks. ECF can be awarded for <b>L</b> based on <b>K</b>. No ECF for <b>M</b> as <b>M</b> can be worked to backwards from product.</p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

(i)

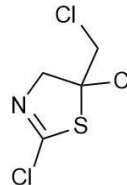
**Intermediate V·**



**Intermediate W·**



**Y**



*One mark for V·, two marks for W· and one mark for Y. Position of radical must be clearly indicated with a dot for V· and W·. No ECF can be awarded as there is sufficient new information about each species.*

(j)

**Reagent X**



**Chain-carrying radical Z·**



*One mark each.*



Total out of 27

**27**