

# Structures and Bonding

## Polymers

## Worksheet

Combined Science - Chemistry - Key Stage 4

Mr Robbins



# Periodic Table of Elements

Key:

relative atomic mass → **1**

Atomic symbol ← **H**

Name → hydrogen

Atomic (proton number) ← **1**

<b>1</b> <b>H</b> hydrogen 1																	<b>4</b> <b>He</b> helium 2
<b>7</b> <b>Li</b> lithium 3	<b>9</b> <b>Be</b> beryllium 4											<b>11</b> <b>B</b> boron 5	<b>12</b> <b>C</b> carbon 6	<b>14</b> <b>N</b> nitrogen 7	<b>16</b> <b>O</b> oxygen 8	<b>19</b> <b>F</b> fluorine 9	<b>20</b> <b>Ne</b> neon 10
<b>23</b> <b>Na</b> sodium 11	<b>24</b> <b>Mg</b> magnesium 12											<b>27</b> <b>Al</b> aluminium 13	<b>28</b> <b>Si</b> silicon 14	<b>31</b> <b>P</b> phosphorus 15	<b>32</b> <b>S</b> sulfur 16	<b>35.5</b> <b>Cl</b> chlorine 17	<b>40</b> <b>Ar</b> argon 18
<b>39</b> <b>K</b> potassium 19	<b>40</b> <b>Ca</b> calcium 20	<b>45</b> <b>Sc</b> scandium 21	<b>48</b> <b>Ti</b> titanium 22	<b>51</b> <b>V</b> vanadium 23	<b>52</b> <b>Cr</b> chromium 24	<b>55</b> <b>Mn</b> manganese 25	<b>56</b> <b>Fe</b> iron 26	<b>59</b> <b>Co</b> cobalt 27	<b>59</b> <b>Ni</b> nickel 28	<b>63.5</b> <b>Cu</b> copper 29	<b>65</b> <b>Zn</b> zinc 30	<b>70</b> <b>Ga</b> gallium 31	<b>73</b> <b>Ge</b> germanium 32	<b>75</b> <b>As</b> arsenic 33	<b>79</b> <b>Se</b> selenium 34	<b>80</b> <b>Br</b> bromine 35	<b>84</b> <b>Kr</b> krypton 36
<b>85</b> <b>Rb</b> rubidium 37	<b>88</b> <b>Sr</b> strontium 38	<b>89</b> <b>Y</b> yttrium 39	<b>91</b> <b>Zr</b> zirconium 40	<b>93</b> <b>Nb</b> niobium 41	<b>96</b> <b>Mo</b> molybdenum 42	<b>[97]</b> <b>Tc</b> technetium 43	<b>101</b> <b>Ru</b> ruthenium 44	<b>103</b> <b>Rh</b> rhodium 45	<b>106</b> <b>Pd</b> palladium 46	<b>108</b> <b>Ag</b> silver 47	<b>112</b> <b>Cd</b> cadmium 48	<b>115</b> <b>In</b> indium 49	<b>119</b> <b>Sn</b> tin 50	<b>122</b> <b>Sb</b> antimony 51	<b>128</b> <b>Te</b> tellurium 52	<b>127</b> <b>I</b> iodine 53	<b>131</b> <b>Xe</b> xenon 54
<b>133</b> <b>Cs</b> caesium 55	<b>137</b> <b>Ba</b> barium 56	<b>139</b> <b>La*</b> lanthanum 57	<b>178</b> <b>Hf</b> hafnium 72	<b>181</b> <b>Ta</b> tantalum 73	<b>184</b> <b>W</b> tungsten 74	<b>186</b> <b>Re</b> rhenium 75	<b>190</b> <b>Os</b> osmium 76	<b>192</b> <b>Ir</b> iridium 77	<b>195</b> <b>Pt</b> platinum 78	<b>197</b> <b>Au</b> gold 79	<b>201</b> <b>Hg</b> mercury 80	<b>204</b> <b>Tl</b> thallium 81	<b>207</b> <b>Pb</b> lead 82	<b>209</b> <b>Bi</b> bismuth 83	<b>[209]</b> <b>Po</b> polonium 84	<b>[210]</b> <b>At</b> astatine 85	<b>[222]</b> <b>Rn</b> radon 86
<b>[223]</b> <b>Fr</b> francium 87	<b>[226]</b> <b>Ra</b> radium 88	<b>[227]</b> <b>Ac*</b> actinium 89	<b>[267]</b> <b>Rf</b> rutherfordium 104	<b>[270]</b> <b>Db</b> dubnium 105	<b>[269]</b> <b>Sg</b> seaborgium 106	<b>[270]</b> <b>Bh</b> bohrium 107	<b>[270]</b> <b>Hs</b> hassium 108	<b>[278]</b> <b>Mt</b> meitnerium 109	<b>[281]</b> <b>Ds</b> darmstadtium 110	<b>[281]</b> <b>Rg</b> roentgenium 111	<b>[285]</b> <b>Cn</b> copernicium 112	<b>[286]</b> <b>Nh</b> nihonium 113	<b>[289]</b> <b>Fl</b> flerovium 114	<b>[289]</b> <b>Mc</b> moscovium 115	<b>[293]</b> <b>Lv</b> livermorium 116	<b>[293]</b> <b>Ts</b> tennessine 117	<b>[294]</b> <b>Og</b> oganesson 118

\* The lanthanides (atomic numbers 58 - 71) and the Actinides (atomic numbers 90 - 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.



1. Polyethane is made of carbon and hydrogen only. Ethane is also made of carbon and hydrogen only. Why does polyethane have a much higher melting point than Ethane?
2. Define polymer
3. Define monomer



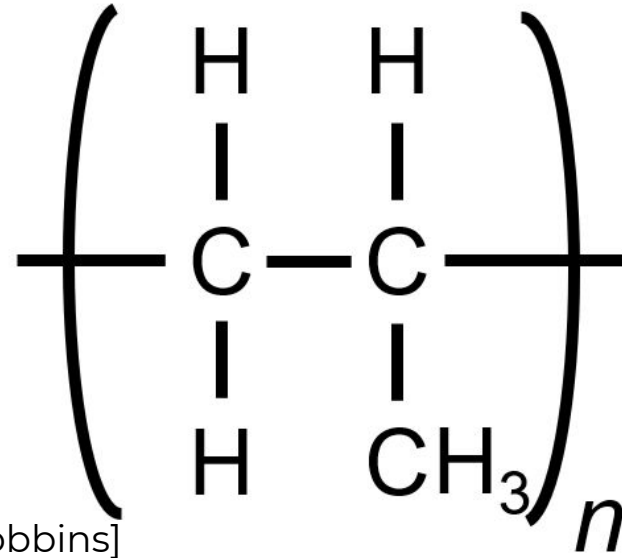
# Answers

1. Polyethane is a long chain molecule. It has many more intermolecular/attractive forces between the molecules so requires more energy to separate them.
2. A long-chain molecule made of many monomers
3. The small repeated unit that makes a polymer



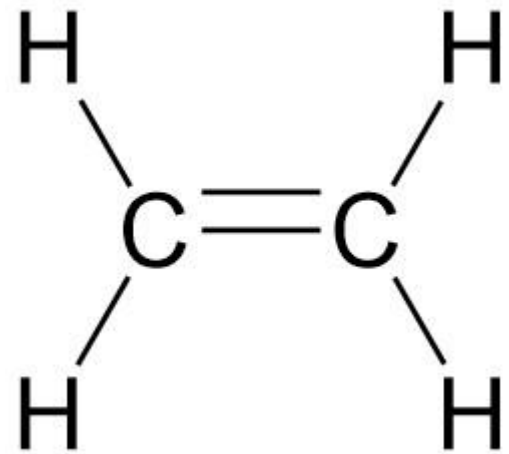
# Quick check

Choose the right monomer for this polymer

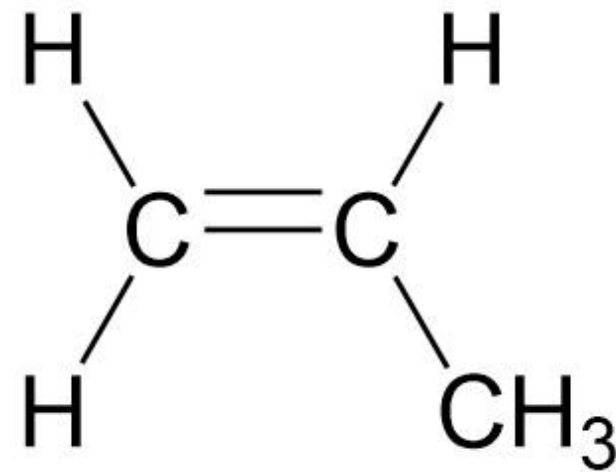


Credit [ARobbins]

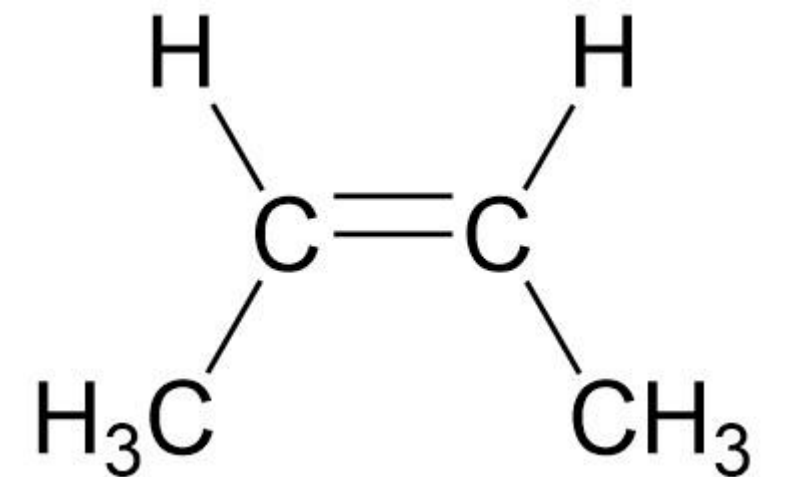
**A**



**B**

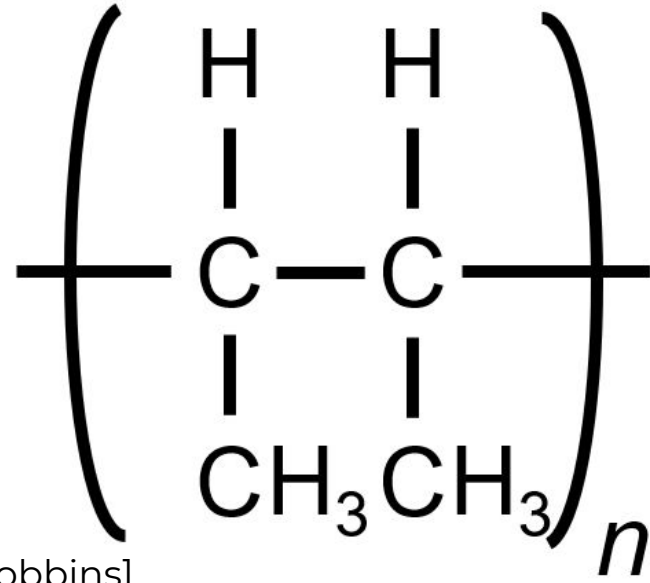


**C**



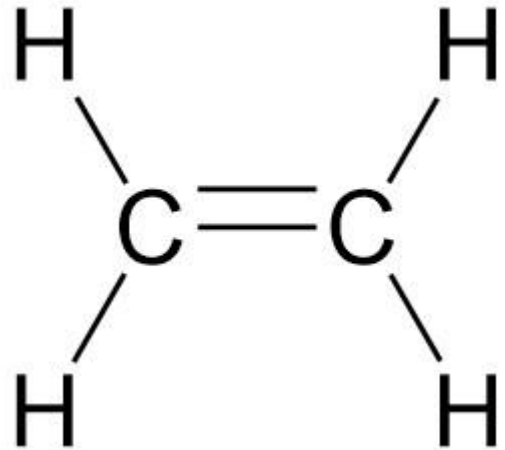
# Quick check

Choose the right monomer for this polymer

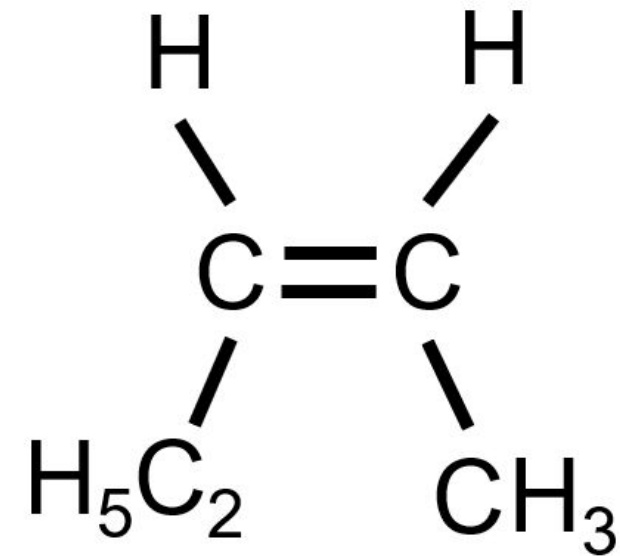


Credit [ARobbins]

A

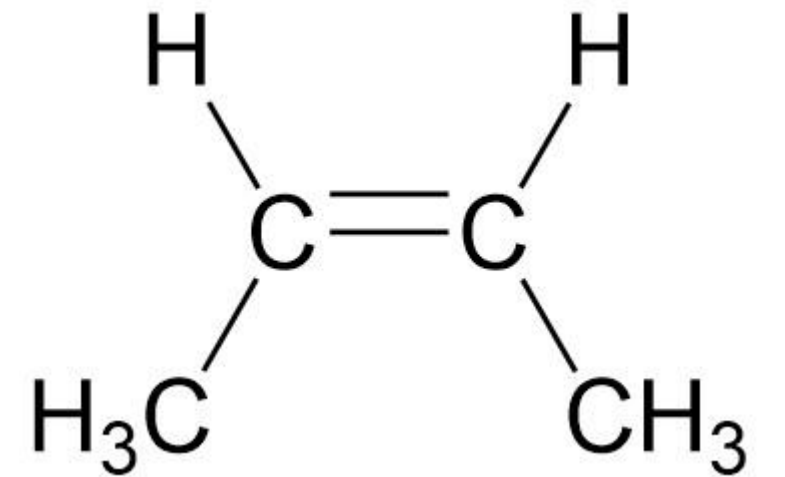


B



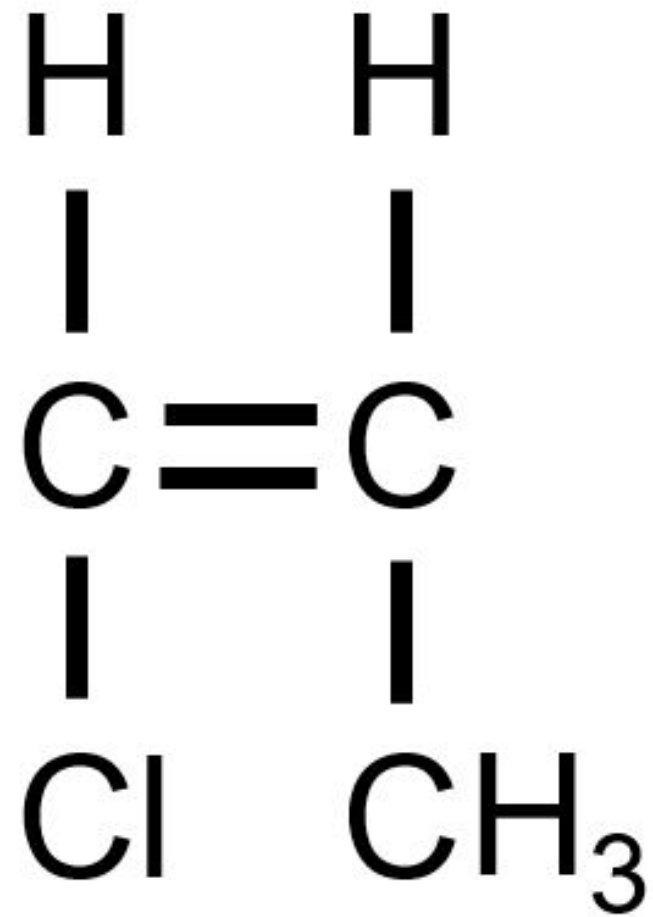
Credit [ARobbins]

C



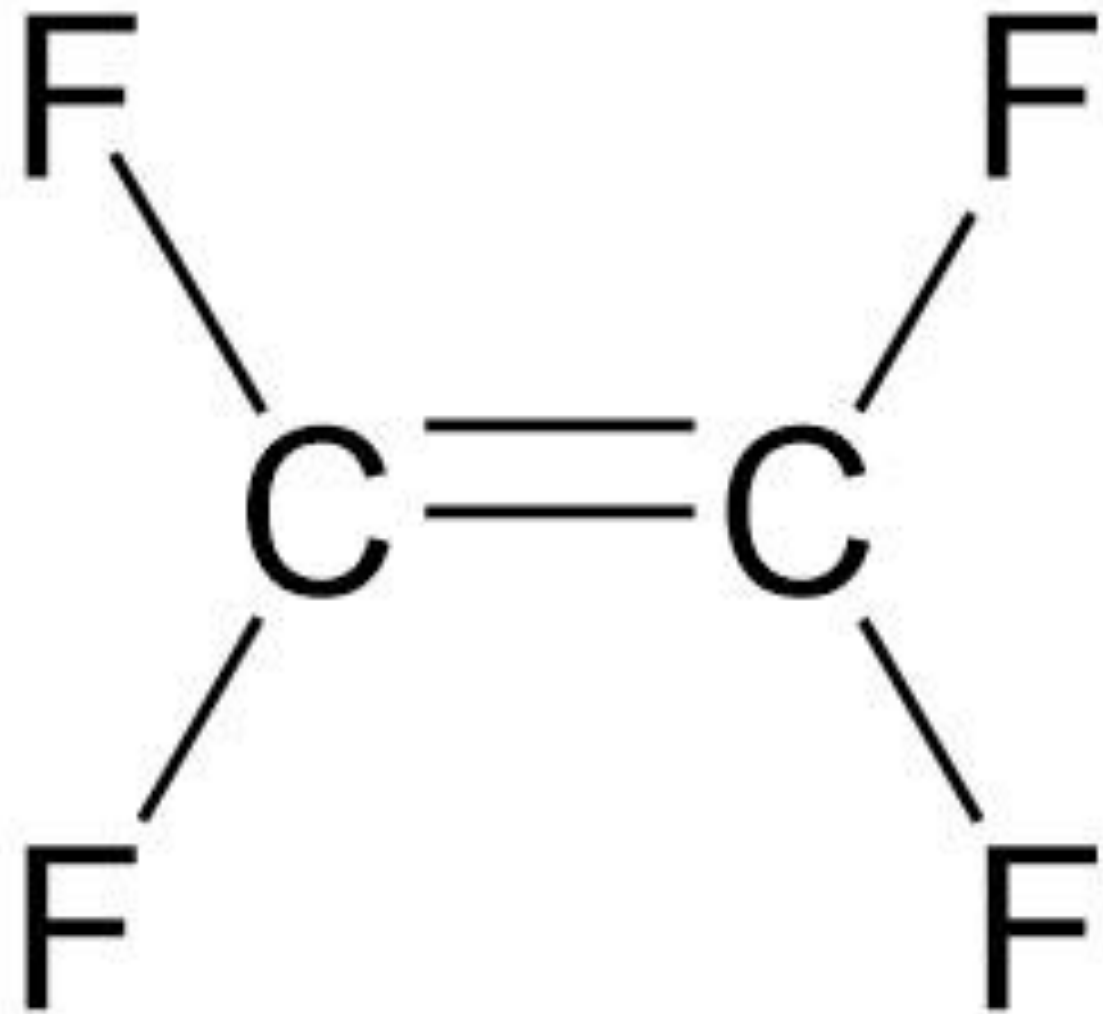
# Quick check

Draw the correct polymer for this monomer



# Quick check

Draw the correct polymer for this monomer





# Quick check

Ethene is a gas at room temperature but polyethene is a solid.  
This is because...

## Option 1

Polyethene has many more strong covalent bonds.

## Option 3

Polyethene long chains have a lot more weak forces of attraction between them.

## Option 2

Polyethene long chain molecules get tangled together making knots

## Option 4

Polyethene has strong electrostatic attraction between opposite charges

