

GCSE Chemistry - Chemistry - Key Stage 4

Organic chemistry

# Carboxylic acids

Dr Patel



# Periodic Table of Elements

Key:

relative atomic mass →

Name →

Atomic symbol

Atomic (proton number)

Source of image: Oak

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



# Independent practice

1. What is the common name for ethanoic acid?
2. What is the functional group found in carboxylic acids?
3. Name the first 4 carboxylic acids in order.
4. What do the names of all carboxylic acids end in?

Challenge:

A carboxylic acid has 10 carbon atoms. State its name.



# Independent practice

Draw the displayed formula for propanoic acid and butanoic acid.

## Support:

1. Draw your COOH group
  - Draw the C
  - Attach an O to the C using a double bond
  - Attach the OH group to C, by the O, with a single bond
  -
2. Draw the rest of the hydrocarbon
  - Remaining carbon atoms
  - 4 bonds from each carbon atom
  - Draw in your hydrogen atoms



# Pause point

1. Are carboxylic acids soluble or insoluble in water?
2. What colour does universal indicator turn when added to carboxylic acids?
3. What is the rough pH range of carboxylic acids?
4. What is the general word equation for the reaction between a carboxylic acid and a metal carbonate?
5. What gas is produced when a metal carbonate reacts with acid?

Challenge: Write a word equation for the reaction between sodium carbonate and ethanoic acid.



# Independent practice

1. Why does hydrochloric acid have a lower pH than ethanoic acid?
2. If the pH of ethanoic acid is 5 and hydrochloric acid is 2, what is the difference in hydrogen ion content?
3. How many orders of magnitude is this?



# Independent task

1. What are the two products when an alcohol reacts with a carboxylic acid?
2. What small molecule is released when an alcohol reacts with a carboxylic acid?
3. Complete the following equations.

Methanol + ethanoic acid →

Propanol + methanoic acid →

Butanol + propanoic acid →

