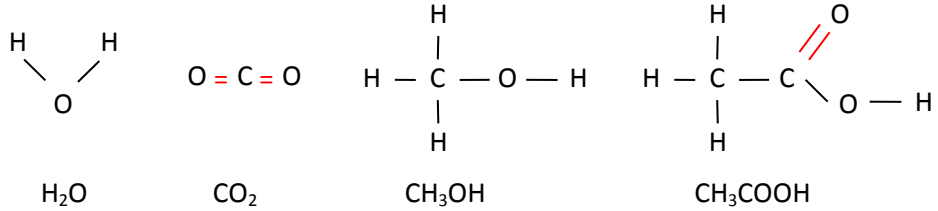
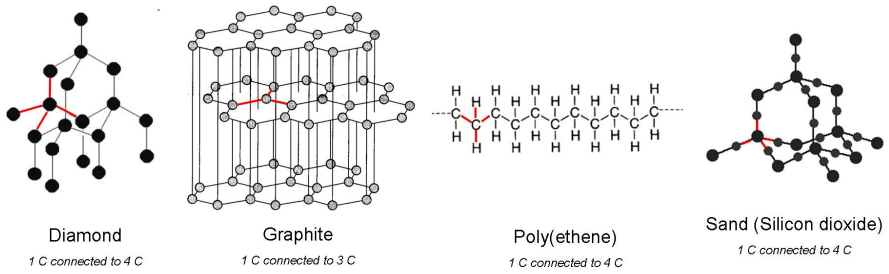
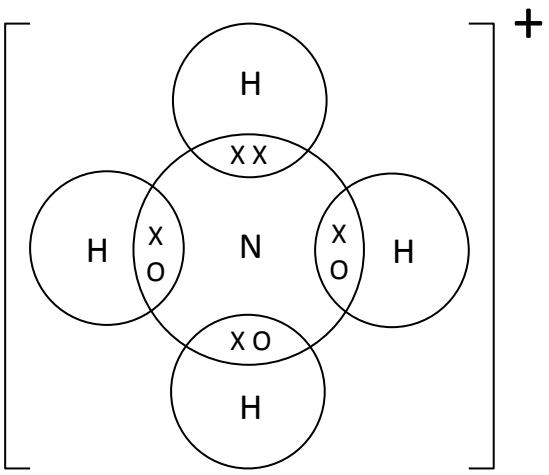
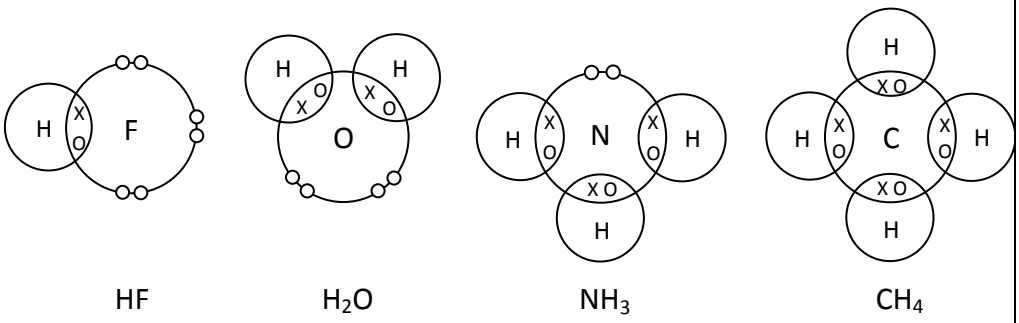
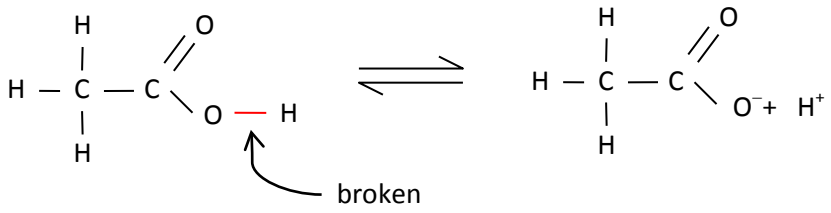
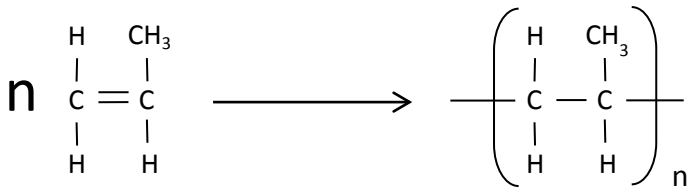
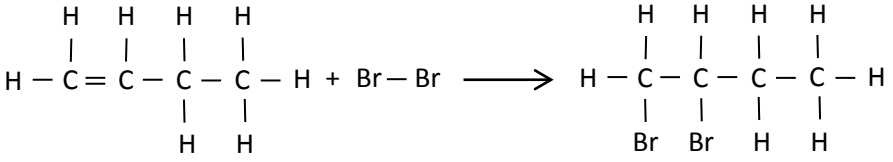
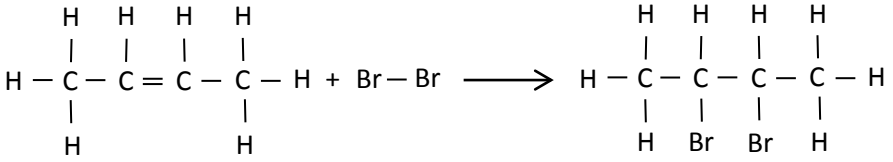
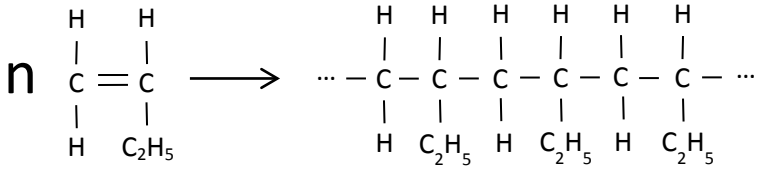
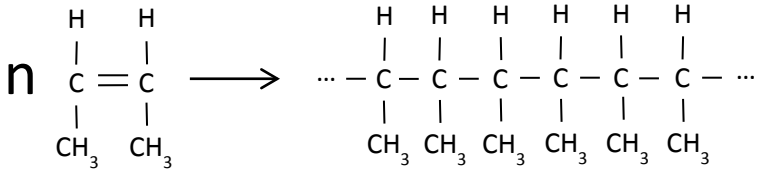
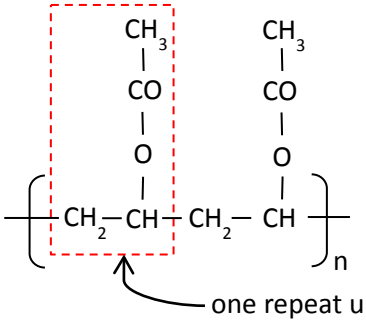
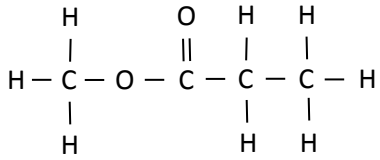
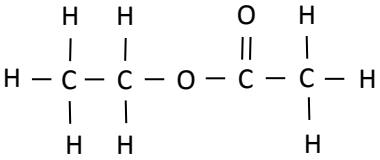
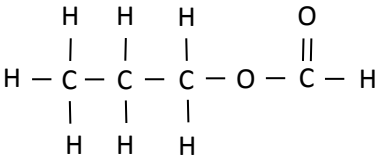
#	Ans	Workings/Remarks
1	C	The kinetic particle theory of matter states that all particles are in continuous motion, and so oxygen and bromine molecules continually move until they are evenly mixed in both jars.
2	D	M_r of NH_3 = 17 g/mol M_r of HCl = 36.5 g/mol HCl will diffuse slower since its heavier and meet NH_3 at the side nearer to HCl.
3	D	Since the evolution of NH_3 gas only occurs after the addition of Al foil, there cannot be an ammonium ion present. "Al foil, sodium hydroxide and heat" is a nitrate ion test.
4	A	The ions that make up X_2Y are X^+ and Y^{2-}. In this ionic compound, metal atom X gives away **1** electron to for X+ and Y atom receives **2** electrons to form Y^{2-}
5	A	While the number of electrons in the metal remains constant due to the conservation of mass, the metal being part of a closed circuit will have more electrons coming from the circuit to take the place of those who have flowed on from one side to another, so the electrons cannot be permanently held at one end only. Furthermore with the current switched off, the arrangement of the electronics should return to what it was like before the current was switched on i.e. the original diagram! It is interesting to note that B is not possible since cations are not able to move freely in the lattice.
6	C	 H_2O CO_2 CH_3OH CH_3COOH
7	B	 Diamond *1 C connected to 4 C* Graphite *1 C connected to 3 C* Poly(ethene) *1 C connected to 4 C* Sand (Silicon dioxide) *1 C connected to 4 C*
8	D	MR of one repeat unit of $-O\text{-}Si(CH_3)_2-$ = 74 % of C = 24/74 × 100 = 32.4% % of H = 6/74 × 100 = 8.1% % of Si = 28/74 × 100 = 37.8% % of O = 16/74 × 100 = 21.6%

9	B	No of moles of water formed = 27g / 18gmol^{-1} Since 1 mol of NH_4NO_3 forms 2 moles of water (from the equation) No of moles of NH_4NO_3 = 27g / 18gmol^{-1} × ½ = 27g / 36gmol^{-1} ∴ mass of NH_4NO_3 = 27g / 36gmol^{-1} × 80 gmol^{-1}
10	A	The ions in the solution are : H^+ Cu^{2+} Mg^{2+} OH^- SO_4^{2-} At the cathode, cations of H^+, Cu^{2+}, Mg^{2+} are attracted and the ion lowest in the reactivity series, Cu^{2+} , will be discharged preferentially to form Cu.
11	B	Since the graph ends lower at the end compared to the start, the energy of the reactants was given out, hence the products have a lower energy level, and this is an exothermic reaction.
12	A	Experiment 1 finishes earlier and has a steeper gradient, hence both these points need to be reflected in the graphs shown, which is Graph A.
13	B	Cl_2 + 2NaOH → NaCl + NaClO + H_2O Oxidation no: 0 +1 −1
14	D	
15	A	Pb^{2+} (aq) + SO_4^{2-} (aq) → $PbSO_4$(s)
16	D	Acidic oxides change blue litmus to red, and they are oxides of non-metals, which makes R a non-metal. Sulfur dioxide is used to kill bacteria in the preservation of dried fruit.
17	A	Alkali metals have decreasing boiling and melting points upon descending the group.
18	A	Since the overall oxidation state of compounds is zero, Let eh oxidation number of Cr be *x*. SO_4^{2-} is known to have an oxidation state of 2−. $2x + 3(-2) = 0$ $x = +3$
19	D	Metals form positive ions and thus have the tendency to giveaway electrons. As we move across the period, the number of valence electrons increases, and the tendency to give away decreases, hence they become less metallic and more non-metallic in character.
20	B	In the catalytic convertor, carbon monoxide and oxides of nitrogen are converted into carbon dioxide and nitrogen gas.

21	B	Since Chromium is **able to displace** Nickel ions, Cr is more reactive than Ni Since Manganese is **able to displace** Nickel ions, Mn is more reactive than Ni Since Chromium is **unable to displace** Manganese, Cr is less reactive than Mn
22	A	1 The blast furnace process involves the oxidation of carbon which produces carbon dioxide. 2 Scrap metal is on average 98% iron and 2% other elements, while haematite is only 70% iron and the rest of the 30% rock is impurities, hence the yield of iron obtained is higher with scrap metal. 3 Scrap metal recycling will lead to landfills having less build up
23	D	Zinc is above lead hence is the only metal in the four that is able to react with steam, This produces hydrogen gas collected by the water displacement method. $2Zn(s) + 2H_20(l) \rightarrow 2Zn(OH)_2(s) + H_2$
24	B	With a pH of 1, it is a highly acidic solution and hence has a high concentration of H+ ions. But there will be still some OH^- ions because water (it is an aqueous solution) ionizes slightly to give a small amount of H^+ and OH^- ions.
25	D	Dot-cross diagrams of valence electrons only:  HF H_2O NH_3 CH_4
26	A	Since metal Y is more reactive than X, it will displace X from the solution, and the blue color of the solution will fade since X is no longer in the solution.
27	D	Zinc is more reactive than iron and will corrode in place of the iron in sacrificial protection.
28	D	Incomplete combustion yields un-burnt hydrocarbons (C_8H_{18}) soot (C) and Carbon monoxide (CO)
29	D	Zinc is reactive enough to react with acids but not cold water. Calcium and Sodium both react with cold water to form hydroxides and hydrogen gas. Copper does not react with either acids or cold water.
30	A	$N_2 + 3H_2 \leftrightharpoons 2NH_3$ At low temperatures the production of NH_3 is encouraged, which means at high temperatures, the reverse reaction is favoured and NH_3 decomposes instead.
31	C	
32	D	Poly(propene) is an addition polymer

33	B	
34	C	Condensation Polymers: Nylon &Terylene Addition polymers: Poly(ethene)
35	B	- Since both molecules consists of the same number of C atoms, they both will form the same number of carbon dioxide molecules, and hence the same moles - Both will decolorise bromine water due to the double bond between C atoms  1, 2-dibromobutane  2, 3-dibromobutane - Both compounds become butane after reaction with hydrogen  poly(but-1-ene)  poly(but-2-ene)
36	A	 one repeat unit

37	B	As the carbon chain length increases, the oxygen needed for combustion decreases, thus the flammability decreases.
38	C	Since only one mole of hydrogen gas is required, it is a alkene which has only one C=C double bond.
39	C	The oxidation of an alcohol yields and acid, so butanoic acid (displayed) is formed from butanol.
40	A	**1** methyl propanoate  $C_2H_5COOCH_3$ **2** ethyl ethanoate  $CH_3COOC_2H_5$ **3** propyl methanoate  $HCOOC_3H_7$ All 3 compounds have the formula $C_4H_8O_2$