Answers

Atomic structure and the periodic table
Review it!

1 a D   b B   c D   d D   e A

2 a

Element	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electronic stucture
A	3	7	3	4	3	2,1
B	17	35	17	18	17	2,8,7
C	11	23	11	12	11	2,8,1
D	10	20	10	10	10	2,8
E	19	39	19	20	19	2,8,8,1

b i D   ii E   iii A, C and E
   iv D   v B

c i Element E is potassium. When added to water it melts, moves across the surface the water in the hydrogen produced in the reaction ignites to give a lilac flame. The potassium disappears to form an alkaline solution of potassium hydroxide.

   ii When both elements react they lose their outer electron. The outer electron of E is further from the nucleus than that of A and it has more shielding electrons. This means that its outer electron feels less of an attractive force from the nucleus and is more easily lost, making element E more reactive.

d A, C and E

e B

f B. B is chlorine and E is potassium. Therefore the compound formed is potassium chloride.

Chemical changes
Review it!

1

Electrolyte	Product at cathode	Product at anode
Molten sodium chloride	Sodium metal	Chlorine gas
Molten aluminium oxide	Aluminium metal	Oxygen gas
Aqueous sodium chloride solution	Hydrogen gas	Chlorine gas
Aqueous sodium sulfate solution	Hydrogen gas	Oxygen gas

2 a Hydrogen at cathode; bromine at anode.

   b A solution of potassium hydroxide.

H3 a i Hydrochloric acid is a stronger acid than ethanoic acid.

      ii The pH of the hydrochloric acid is 2 units lower. This means that the concentration of hydrogen ions is 2 orders of magnitude (10^2) or 100 times greater.

b i Hydrogen gas

   ii Because the hydrogen ion concentration is greater in hydrochloric acid the reaction will be faster.

   iii $2H^+(aq) + Mg(s) \rightarrow H_2(g) + Mg^{2+}(aq)$

c Orange (weak acid)

4 a i The burette can be read to $0.05\ cm^3$, so the results must be given to 2 decimal places.

      ii A = 11.00; B = 10.50; C = 10.8; D = 43.80

      iii $10.80\ cm^3$

      iv The hydrochloric acid is the more concentrated because it needs a lower volume to neutralise the sodium hydroxide solution.
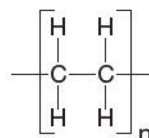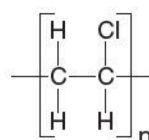
Organic chemistry
Review it!

1 a Nucleotides
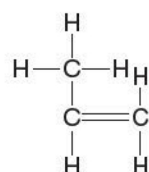
   b Amino acids

   c Glucose

2 a i

   ii

   iii

b i

   ii $HOOCCH_2CH_2COOH$ and $HOCH_2CH_2CH_2CH_2OH$

Using resources
Review it!

1 a Saves on energy because the extraction of aluminium uses lots of energy. Reduces use of aluminium ore which is a finite resource.

b Low density

c Relatively low density

d i Chromium and nickel

ii It does not rust and it is tough, so does not chip easily.

2 a Y is a better thermal conductor than Z, but Z has a much lower melting point and would melt at the temperatures used for an oven.

b The ratio $= 9 \times \frac{10^{13}}{3} \times 10^{-8} = 3 \times 10^{21}$

c i Y because it has a high melting point and relatively low thermal conductivity.

ii X because it has a very good relative thermal conductivity, therefore heat from the cooker will warm up the food/water more easily.

d i X is a metal because it has a low electrical resistivity and good thermal conductivity.

ii Y is a ceramic because it has a high melting point, relatively low conductivity and high electrical resistivity.