Syllabus 1036

Science: Chemistry

Paper 3H

MARK SCHEME – Summer 2002

1. (a) (i) sedimentary; 1

(ii) metamorphic; 1

(b) (i) An explanation to include:
1. magma/molten rock/lava;
2. cooled/solidified; 2

(ii) (magma) cooled slowly/intrusive; 1

(c) A suggestion to include four from:
1. limestone (in correct context);
2. heated;
3. put under pressure;
4. by hot igneous rock/magma;
5. over long period of time; 4

Total 9 marks

2. (a) (i) alkali metals/group 1; 1

(ii) francium/Fr; 1

(b) (i) four points correctly plotted;;
three points correctly plotted;
smooth curve/precise ruled lines (discrete data); 3

(ii) A description to include:
either
1. melting point decreases;
2. as the atomic number increases;
or
1. melting point increases;
2. as the atomic number decreases; 2

(iii) atomic number - 19;
melting point - read from graph; [Allow ecf]
°C; 3

(iv) weak**er** forces/bonds between Na atoms/in Na metal
(than between Li atoms); 1

(c) (i) endothermic; 1

(ii) energy needed to allow particles to move **about**/break bonds; 1
[Reject vibration]

Total 13 marks

3. (a) $2Ni + O_2 \longrightarrow 2NiO$
all formulae correct;
balancing of correct formulae; 2

(b) chlorine/hydrogen chloride; 1
[Accept correct formulae]

(c) coloured; 1
[Reject green/same colour]

(d) (i) **Either**
copper less reactive;
zinc more reactive (than nickel);

or order: zinc, nickel, copper;; 2

(ii) zinc + nickel chloride $\longrightarrow$ nickel + zinc chloride
zinc chloride product;
complete correct equation – 2 marks 2

(e) (i) changes speed of a reaction/
explanation of catalytic activity; 1

(ii) catalyst - iron;
gas 1 - nitrogen; } in either order
gas 2 - hydrogen; } 3

Total 12 marks

4. (a) (i)

sulphur atom	atomic number	number of protons	number of neutrons	number of electrons
Y	16	16	18	16

All four correct - 2 marks
three correct - 1 mark
two/one correct - 0 marks 2

(ii) isotopes; 1

(b) two electrons;
to fill up outer shell/OWTTE; 2

(c) (i) covalent; 1

(ii) (2 + 32 =) 34; 1

(d) (i) An explanation to include two from:
1. acid rain;
2. any one consequence e.g. kills fish;
3. second consequence; 2
[Ignore global warming]

(ii) An explanation to include two from:
1. poisonous/toxic gas;
2. forms sulphur dioxide (on burning);
3. unpleasant smell; 2

Total 11 marks

5. (a) (i) A description to include:
as temperature rises, **rate** increases;; 2
[Allow as temperature rises, reaction time falls for 1 mark]
[Reject time/speed speeds up or down]

(ii) An explanation to include three from:
1. higher temperature ⟶ more energy;
2. particles move faster;
3. hit more frequently;
4. hit more energetically; 3

(iii) An explanation to include:
1. gives out heat;
2. any suitable consequence; 2

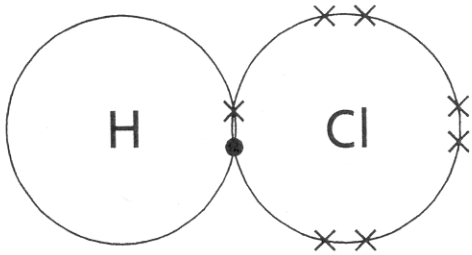
(b) A suggestion to include two from:
1. acid in burette/pipette;
2. repeat experiment;
3. record time to one decimal point;
4. water bath;
[Reject heat retention]
5. clean magnesium ribbon;
6. record temperature to one decimal point;
7. collect more data;
8. obtain average temperature; 2

(c) extra surface area;
gives faster rate;

none/little;
very small surface area in revealed surfaces;
hence little change in rate; 3

Total 12 marks

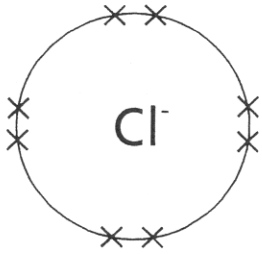
6. (a) (i)



shared pair in HCl;
fully correct; 2
[Deduct 1 mark for incorrect inner electrons]

(ii) weak forces **between** molecules; 1

(b) (i)



8 electrons; 1
[No mark if incorrect inner electrons]

(ii) $2H^+ + 2e^- \longrightarrow H_2$
formulae of H^+ and H_2;
fully correct; 2
[Allow $H^+ + e^- \longrightarrow H$ for 1 mark]

(c) **Either**
strontium above hydrogen (in the reactivity series);
hydrogen displaced;
or
strontium high in reactivity series; 2
vigorous reaction;
[Reject strontium reactive]

Total 8 marks

7. (a) A description to include four from:
1. dissolve/melt;
2. electrolysis cell/electrodes/named electrodes;
3. pass current/electrolysis;
4. chlorine formed at anode;
5. further relevant details
(for example hydrogen also formed); 4

(b) (i) kills bacteria; 1

(ii) too dilute to affect humans; 1

(c) A calculation to include:
either
1. $2 \times 31 \longrightarrow 2 \times 137.5$;

2. 0.93 g $\longrightarrow \dfrac{2 \times 137.5}{2 \times 31} \times 0.93$;

3. 4.125 (g)

or
1. $\dfrac{0.93}{31} = 0.03$;

2. $PCl_3 = 137.5$ / $2PCl_3 = 275$;

3. $137.5 \times 0.03 = 4.125$ (g); 3

(d) (i) less; 1
[Ignore reference to rate]

(ii) more; 1

(iii) no change; 1

(e) A calculation to include:
1. Cl = 4.62 – 0.36 = 4.26g;
2. $\frac{0.36}{12} = 0.03$ $\frac{4.26}{35.5} = 0.12$;
3. 1 : 4;
4. CCl_4 **deduced**; 4

[CCl_4 formula **without** any working out shown scores no marks]

Total 16 marks

8. (a) (i) C_8H_{18}; 1

(ii) An explanation to include:
1. single C-C bonds/no double bonds/saturated;
2. hydrocarbon; 2

[Accept C_nH_{2n+2} for two marks]
[Hydrocarbon **alone** scores no marks]

(iii) $2C_6H_{14}(l/g) + 19O_2(g) \longrightarrow 12CO_2(g) + 14H_2O(l/g)$
RHS formulae;
LHS formulae;
balanced;
all correct state symbols; 4

(b) An explanation to include:
1. monomers link;
2. by double bonds breaking; 2

[Accept the answer in terms of a correct diagram for 2 marks]

Total 9 marks

TOTAL MARKS 90