

Syllabus 1036

Science: Chemistry

Paper 3H

MARK SCHEME – Summer 2001

1. argon;
potassium;
sodium chloride;
chlorine;
carbon dioxide;
iron; 6
- Total 6 marks**
2. (a) propane/C₃H₈ ;
C and H (only); 2
- (b) An explanation to include:
• two elements/carbon and oxygen;
• bonded/combined/reacted together; 2
- (c) (i) An explanation to include:
• photosynthesis;
• relevant details; 2
[Mention of respiration or breathing scores no marks]
- (ii) oceans dissolve carbon dioxide; 1
- (d) (i) limited supply of oxygen/incomplete combustion; 1
- (ii) An explanation to include two from:
• toxic/poisonous fumes/
leads to unconsciousness/death;
• CO combines with haemoglobin/blood;
• prevents uptake of oxygen;
• odourless; 2
- Total 10 marks**
3. (a) ore/named ore/named relevant metal compound; 1
- (b) (i) heat;
[Reject burning] 1

- (ii) copper **and** carbon dioxide/carbon monoxide; 1
- (iii) oxygen removed/(copper) gains electrons; 1
- (c) A description to include three from:
 • electricity passed/electrolysis;
 • copper/electrode A/anode/
 positive electrode dissolves;
 • copper deposited at electrode B/
 negative electrode/cathode;
 • use of (correct named) electrolyte;
 • impurities fall to bottom;
 [Allow copper transfers from A to B for one mark] 3
- (d) (i) electrical wiring/water pipes/coins/pans; 1
- (ii) **Either** electrical wiring - conductor/ductile;
- or** pipes - does not corrode/malleable;
 [Reject rust]
- or** coins - unreactive;
- or** pans - conductor; 1

Total 9 marks

4. (a) 20-21 (%); 1
- (b) 35;
 cm³; 2
- (c) (i) biological/protein;
 catalyst; 2
- (ii) An explanation to include three from:
 • more energy;
 • move faster;
 [Reject vibrate faster]
 • more (frequent) collisions;
 • more energetic/harder collisions;
 • mention of energy of activation; 3
- (iii) An explanation to include:
 • enzyme denatured/destroyed;
 [Reject killed]
 • no longer functions/changed shape;
 [Reject reaction slows down] 2

- (d) **Either** bread;
yeast;
- or** alcohol;
yeast;
- or** cheese;
rennin/rennet;
- or** yoghurt;
bacteria; 2

[Allow

- glucose/other named substances produced in the body;
- saliva/appropriate **source** of enzyme;]

[Reject washing powder as a product]

Total 12 marks

5. (a) (i) aluminium ion - Al^{3+}
calcium ion - Ca^{2+}
copper ion - Cu^{2+}
sodium ion - Na^{+}
all four correct - 3 marks
three correct - 2 marks
two correct - 1 mark
one correct - 0 marks
[If correct charges only given - 2 marks max
allow +3 or 3+ etc] 3
- (ii) the higher the charge, the lower the pH; 1
- (b) (i) copper (chloride); 1
- (ii) transition metal (compound); 1
- (c) (i) Name - aluminium (chloride);
Equation - $3\text{Mg(s)} + 2\text{AlCl}_3\text{(aq)} \longrightarrow 3\text{MgCl}_2\text{(aq)} + 2\text{Al(s)}$
correct formulae;
balancing;
correct state symbols;
[If Ca/Na chlorides:
formulae **and** balancing;
state symbols;] 4
- (ii) An explanation to include:
• loses electron(s);
• to another metal/to form an ion/
full outer shell/ Mg^{2+} ; 2

(iii) An explanation to include:

Either

- metals/named metals more reactive;
- cannot be displaced (from their salts by magnesium);
[Reject they are more reactive]

or

- they are higher in reactivity series;
- cannot be displaced (from their salts by magnesium);

2

Total 14 marks

6. (a) (i) 35 protons (twice);
44 neutrons;
46 neutrons;

3

(ii) each isotope 50%;

1

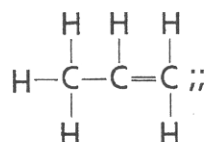
(b) (i) $\text{Cl}_2 + 2\text{Br}^- \longrightarrow \text{Br}_2 + 2\text{Cl}^-$
all four formulae correct - 2 marks
2/3 formulae correct - 1 mark
(formulae must be on correct side of equation)
balancing;

3

(ii) iodine less reactive than **bromine**;

1

(c) (i) propene;



3

[Allow 3 carbon atoms with 1 double bond for 1 mark]

(ii) orange/yellow/brown;
to colourless;
[Reject clear]

2

(iii) Prediction - no colour change;
[Reject no reaction]
Explanation - poly(ethene) has no double bonds/
is saturated;

2

- (iv) Any two from:
- non-toxic;
 - transparent;
 - lightweight;
 - waterproof;
 - unreactive;
 - air tight;
 - durable;
 - easily moulded;
 - flexible;
- [Reject any cost argument/strong] 2

Total 17 marks

7. (a) (i) solid \longleftrightarrow gas; 1
- (ii) 4 electrons/same number of electrons in outer shell; 1
- (iii) A suggestion to include:
- Either**
- carbon and silicon both in group 4/
same group/same number of electrons in outer shell;
 - compounds of elements in same group have similar properties;
- or**
- both covalently bonded;
 - stated property is similar; 2
- (b) (i) Bonding - covalent;
Reason - between non-metallic elements/
both electrical insulators/unlikely to gain/
lose four electrons; 2
- (ii) Structure - giant/(lattice) structure;
[Reject macromolecular]
Reason - high melting point; 2
- (iii) A description to include:
- **molecules** held together;
 - in regular pattern/lattice; 2
- (c) A description to include:
- (high) pressure;
 - heat/high temperature;
 - over **millions** of years; 3
- [Reject long/thousands etc]
[Ignore references to sedimentary rock]

Total 13 marks

8. (a) $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$
correct formulae;
balanced correct formulae and reversible arrow; 2

(b) Advantage 1 - faster reaction;
Reason - more (frequent) collisions/
molecules pushed closer together;
Advantage 2 - higher yield;
Reason - fewer molecules on RHS/
left to right reaction involves decrease
in volume; 4

(c) $(\text{NH}_4)_2\text{SO}_4 = 132$;
percentage of N = $100 \times \frac{28}{132}$;
= 21(.2); 3

[Allow $100 \times \frac{14}{132} = 10.6$ for 1 mark]

Total 9 marks

TOTAL MARK 90