

**JUNE 2002**

**INTERNATIONAL GCSE**

**MARK SCHEME**

**MAXIMUM MARK : 80**

**SYLLABUS/COMPONENT : 0652/3**

**PHYSICAL SCIENCE  
(EXTENDED)**





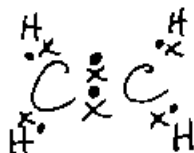
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CH<sub>4</sub>      ①  
balanced      ①

(b) for example



C=C double bond of shared electrons      ①  
correctly filled outer shells      ①

(c) (i) ethene has double bond (between carbon atoms) (which allows reaction)      ①  
ethane has only single bond (between carbon atoms)      ①  
*'Ethene is unsaturated and ethane is saturated' scores only one mark.*

(ii) (add bromine-water to hydrocarbon)  
ethene decolourises bromine (quickly)      ①  
ethane does not decolourise bromine      ①

*The comparison must be clear for two marks.  
For full marks there must be a clear statement about what is seen.*

Total for question 3 : 8 marks

4

(a) (i) fusion      ①      NOT 'fission'.

(ii) Sun OR star      ①  
*Accept 'hydrogen bomb' but not 'atomic bomb'.  
Do not carry an error in (i) forward into (ii).*

(iii) each nucleus is positive      ①  
and repel each other      ①

(b) (i) same atomic number OR same proton number      ①  
different mass number OR different nucleon or neutron number      ①  
*Both statements must be clear for two marks.*

(ii) one proton      ①  
one neutron      ①

(iii)  $E = mc^2$       ①      *Must be c not v.*  
 $m = \text{loss of mass} = 0.03 \times 10^{-27} \text{ (kg)}$  OR  $3.0 \times 10^{-29} \text{ (kg)}$       ①  
evidence that  $3.0 \times 10^8$  has been squared      ①  
energy =  $2.7 \times 10^{-12} \text{ (J)}$       ①  
*Check powers of ten.*

Total for question 4 : 12 marks

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- (a) (lattice of) positive ions      ①  
 (in a) sea of electrons      ①  
 ions and electrons attract      ①
- (b) different sizes of (copper and tin) ions      ①  
 layers do not slide (over each other) easily      ①
- (c) copper wires are flexible      OR      can be bent repeatedly      ①  
*Accept statement that copper is ductile      OR      malleable.*  
 copper is good conductor of electricity      ①  
*Ignore any comment about heat.*  
*Comparison with bronze must be implied.*

Total for question 5 : 7 marks

6

- (a) Any symbols used must be correct, as listed in the syllabus.  
 $P = IV$       OR      equivalent in words      ①  
 evidence that 3 kW has been changed to 3000 W      ①  
 current = 12 A      complete answer      ①
- (b) Any symbols used must be correct, as listed in the syllabus.  
 $R = V/I$       OR      equivalent in words      ①  
 $250 / 12^*$       ①  
 \* value from (i)  
 resistance = 20.8  $\Omega$       OR      21  $\Omega$       complete answer      ①
- (c) (i) longer      OR      equivalent statement      ①  
 (ii) thinner      OR      equivalent statement      ①

Total for question 6 : 8 marks

7

- (a) (i) coating (iron) with zinc      ①  
 (ii) zinc is more reactive than iron      ①  
 so zinc coating 'corrodes away' instead of iron      ①  
*idea of this, but not repetition of text in question paper*
- (iii) aluminium has already (rapidly) reacted with (oxygen in) air      ①  
 to form a protective layer of oxide      ①  
*Note that aluminium does not 'rust'; only iron does this.*
- (b) (i) hydrochloric acid      complete answer      ①  
 (ii) add zinc oxide to the acid until there is excess unreacted zinc oxide      ①  
 filter off the (excess) zinc oxide      ①  
 (iii) leave (filtrate) at room temperature to crystallise      ①  
*Must be clear that the solution is NOT heated.*

Total for question 7 : 9 marks

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### 8

- (a) (i) two different metals (wires) (joined together at one end)  $\oplus$   
*NOT a 'bimetallic' arrangement.*
- (ii) used for high temperatures OR rapidly changing temperatures  $\oplus$
- (iii) *The thermocouple is controlled by the temperature of the air coming from the room for the combustion process. So the correct answer is 'convection currents ✓ of the air in the room ✓'.  
 However, for this particular question, accept .....*  
 conduction OR convection OR radiation  $\oplus$   
 through (by) the air  $\oplus$
- (b) (i) 'silvery' OR 'shiny'  $\oplus$   
*Do not give a mark where there is a contradiction for this situation.  
 For example: 'shiny black' is not acceptable.*
- (ii) infra-red complete answer  $\oplus$

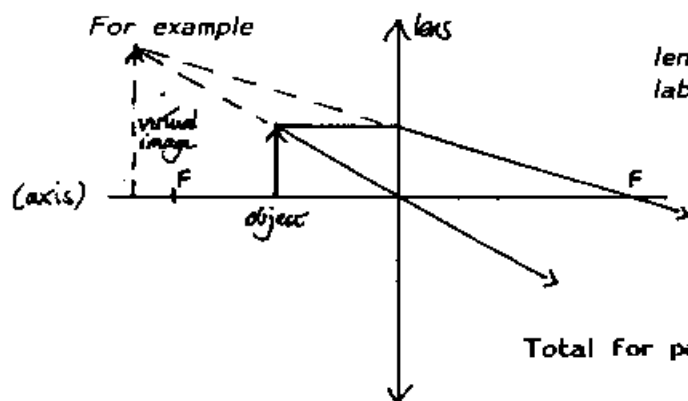
Total for question 8 : 6 marks

### 9

- (a) (i)  $14 + 16$   $\oplus$   
 $30$   $\oplus$
- (ii)  $150 / 30^*$   $\oplus$   
*\* value from (i)*  
 volume =  $5 \times 24 = 120$  (dm<sup>3</sup>) answer  $\oplus$
- (iii) 5 mol NO(g) form  $2\frac{1}{2}$  mol N<sub>2</sub>(g) OR equivalent step  $\oplus$   
 volume =  $120^* / 2 = 60$  (dm<sup>3</sup>) answer  $\oplus$   
*\* value from (ii)*
- (b) incomplete combustion  $\oplus$   
*Note that 'incomplete' must be one word.  
 of hydrocarbons (in air)  $\oplus$   
 Do not accept 'petrol' or 'carbon'.*
- (c) stops oxygen combining (reversibly) with haemoglobin OR equivalent comment  $\oplus$

Total for question 9 : 9 marks

### 10



- lens & object & image & focus all marked and  
 labelled with a clear line for the axis  $\oplus$   
 correct construction  $\oplus$   
 virtual image clearly shown  $\oplus$   
 magnified image  $\oplus$*

Total for question 10 : 4 marks

Total for paper : 80 marks