AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



MARK SCHEME

4.7.1 CARBON COMPOUNDS AS FUELS AND FEEDSTOCK (PACK 4)

SCORE	PERCENTAGE
/88	%

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Mark schemes

Q1.

(a) hydrocarbon

1

(b) thermal decomposition / cracking

1

(c) (i) making polymers / poly(e)thene

accept plastic (bags)

1

(ii) fuel

1

[4]

Q2.

(a) (i) fractional distillation

both words required

accept fractionation

1

(ii) any **one** from

ethane

propane

butane

1

(b) (i) carbon dioxide

1

water (vapour)

accept steam

do not credit symbols

1

(ii) carbon monoxide

accept CO

*do not credit soot **or** carbon oxide*

1

[5]

Q3.

(a) Substance Use

A any **pair** from

award one mark for a correct use for an incorrect fuel

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methane **or** natural gas **or** refinery gas	fuel
ethane	fuel **or** making ethene for polymerisation
propane	bottled **or** camping gas **or** fuel

accept relevant trade names e.g. Calor Gas

butane	*bottled **or** camping gas **or** fuel **or** lighter fuel*

2

B any **pair** from

petrol **or** gasoline	fuel for cars

accept car engines
do not credit just cars

naptha	petrol **or** chemicals **or** feedstock **or** solvent
paraffin **or** kerosene	heating fuel **or** aviation fuel

*accept jet **or** aircraft fuel*

2

C any **pair** from

naptha	petrol **or** chemicals **or** feedstock **or** solvent
paraffin **or** kerosene	heating fuel **or** aviation fuel
diesel **or** diesel oil **or** (light) gas oil	vehicle fuel **or** heating fuel
(lubricating) oil	lubricating **or** oiling qualified, eg. oiling a gate
fuel oil	industrial **or** heating fuel
heavy gas oil	fuel for stationary **or** slow speed diesel engines

2

(b) CO_2 and H_2O

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both required

1

[7]

Q4.

(a) C=C

do not accept C_2H_4

1

four Hs only, two attached to each carbon

credit CH_2CH_2 for two marks

1

(b) $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

two correct formulae LHS

1

can be in either order
two correct formulae RHS

1

can be in either order
correctly balanced, consequential
marking allowed for 10 O

1

[5]

Q5.

(a) heat/light

1

(b) any reference to the products being (colourless) gases/smoke

1

[2]

Q6.

hydrogen
carbon

in any order each for 1 mark

[2]

Q7.

carbon;
hydrogen (any order)

each for 1 mark

[2]

Q8.

(a) Compound A has fewer C atoms
or Compound B has fewer H atoms

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Compound A has C = C/double bond
or Compound A is unsaturated

each for 1 mark
(accept converse i.e compound B has not ...)

2

(b) Compound A is reactive
or can be used to make many substances
or can be used in polymerisation/making plastics/named plastic
or can be used as a fuel

any one for 1 mark

1

[3]

Q9.

(a) (i) oxygen
air

each for 1 mark

2

(ii) carbon dioxide

for 1 mark

1

(b) 30 seconds $\pm$ 5 inclusive

for 1 mark

1

[4]

Q10.

idea of react/reactant/burn/combine
idea of produce/product/formed/make
(NOT a chemical symbol equation)
methane + oxygen identified as reactants
carbon dioxide + water identified as products

each for 1 mark

[4]

Q11.

B will have higher melting point
higher boiling point
be less volatile
be more viscous (allow less flammable)

any two for 1 mark each

[2]

Q12.

(a) substances/chemicals/compounds

gains 1 mark

but gases (accept vapours)

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gains 2 marks

heat (accept light)

for 1 mark

3

(b) carbon dioxide/CO_2
water (vapour)/H_2O
sulphur dioxide/SO_2
(accept correct formulae)

in any order for 1 mark each

3

[6]

Q13.

(a) (i) oxygen (not air)

(ii) oxides/monoxides/dioxides

for 1 mark each

Do not allow specific examples

2

(b) (i) water

(ii) sulphur

(iii) carbon

for 1 mark each

3

(c) gives out/releases heat/energy

for 1 mark

1

(d) (i) carbon dioxide

(ii) carbon

for 1 mark each

(allow correct symbols/formulae)

2

[8]

Q14.

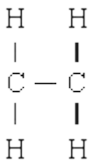
(a) smaller, more useful molecules more reactive (molecules)/(molecules) used to make plastics more easily ignited/better fuels produces unsaturated compounds/alkenes

any two for 1 mark each

2

(b)

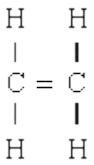
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gains 1 mark

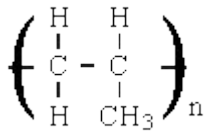
2

but



gains 2 marks

(c) (i)



for 1 mark

1

(ii) poly(propene)
(N.B. brackets not required; *allow* "polypropylene")
for 1 mark

1

[6]

Q15.

(a) nitrogen / N2
[Do not allow N or N^2] for 1 mark

(b) heat
for 1 mark

(c) carbon dioxide / CO_2
for 1 mark

[3]

Q16.

(a) • vertical axis appropriately scaled
[i.e. using more than half the grid]

• all three points correctly plotted* (to < ½ a square)

• reasonably straight line drawn through points (to < half a square)*
[*credit both these marks for bars correctly drawn since discontinuous variable]
each • for 1 mark

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x [If points incorrectly plotted credit 1 mark for the best fit straight line or curve but <u>not</u> point-to-point]

3

(b) 44 (atomic units)

for 1 mark
(e.c.f. i.e. credit consistent with candidate's graph)

1

(c) hydrocarbons / alkanes

for 1 mark

1

(d) C_2H_6
C_5H_{12}

each for 1 mark

[NB figures <u>must</u> be subscripted]

2

[7]

Q17.

(a) each bar correct height (2 bars) to less than ± ½ square

1 mark for each

both bars correctly labelled (in relation to size of bars)

for 1 mark

3

(b) less

gains 1 mark

but a lot less / much less / 18 times less or more if referring to coal

gains 2 marks

2

(c) (i) carbon
sulphur

for 1 mark each

2

(ii) *ideas that*

- at high temperatures, (produced when fuels burn)
- nitrogen <u>and</u> oxygen from atmosphere combine / react

for 1 mark each

2

[9]

Q18.

(a) both bars correct height (to better than half a square)

1 mark for both

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both bars correctly labelled
(w.r.t. relative heights if these incorrect)

for 1 mark

2

(b) a lot less / much less / 18 times less (converse must specify coal)

gains 1 mark

1

(c) *ideas that*

- at high temperatures (produced when fuels burn)
- nitrogen and oxygen from air / atmosphere combine / react
  or nitrogen from air / atmosphere oxidises

for 1 mark each

2

(d) *ideas that*

- coal produces most carbon dioxide / more CO_2 than gas / oil
- because coal is (mostly) carbon
- gas produces less carbon dioxide than coal / oil
- oil and gas also contain hydrogen / contain more hydrogen atoms than carbon atoms / also produce water

any three for 1 mark each

3

(e) sulphur

for 1 mark

2

[9]

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