

iG ALL EQ P6 Essay type questions by topic 124marks

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Topic 1

04w6

7 Forged Banknote

A fake banknote can be investigated by dissolving the ink off the paper.

You are provided with four different inks from four different criminals. Describe an experiment to show which one of these inks is the same as the ink from the banknote.

You can use a labelled diagram to help you answer the question.

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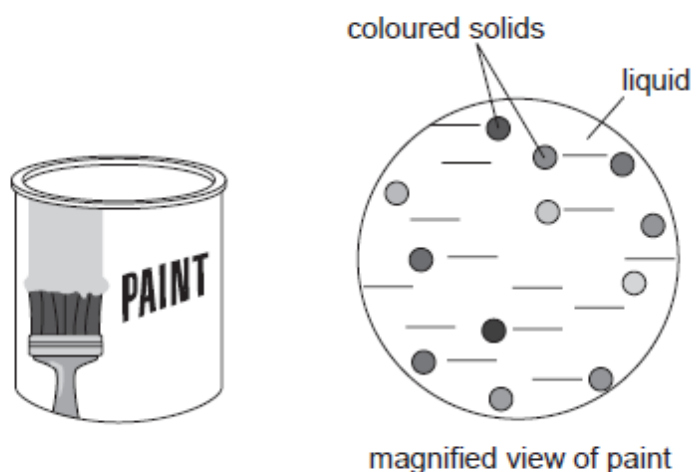
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[6]



- 6 You are provided with a pot of paint as shown below.



The paint is a mixture of a liquid and a solid.
The liquid can be dissolved in water. The solids are insoluble in water but soluble in organic solvents.

- (a) How can a sample of the solid be separated from the rest of the paint?

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 [2]

- (b) How would you determine the number of coloured substances contained in the solid you separated in (a)?

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 [4]

- (c) The label on the paint tin states

"Touch-dry in three hours"

- (i) How could you check this value?

.....
 [2]

- (ii) Suggest how you could speed up this drying process.

..... [1]

7 Leaves from trees contain a mixture of coloured pigments which are not soluble in water. A student was given these two instructions to investigate the pigments in the leaves.

1. Crush some leaves to extract the coloured pigments.
2. Use the liquid extract to find the number of coloured pigments in the leaves.

(a) What would the student need in order to effectively carry out instruction 1?

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..... [3]

(b) Describe an experiment to carry out instruction 2.
A space has been left below if you want to draw a diagram to help answer the question.

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..... [4]

[Total: 7]



11w6

- 6** Seawater contains sodium chloride and other salts.
Plan an experiment to find the mass of salts in 1 dm^3 of seawater.
You will be provided with a small bottle of seawater.
You should include details of the method and any apparatus used.
($1 \text{ dm}^3 = 1000 \text{ cm}^3$)

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..... [6]

[Total: 6]

Topic 5

02s6

8

ELECTROPLATING A COPPER KEY

Electroplating is when a metal is coated with another metal using electricity.

To electroplate a metal a very clean surface is needed.

Describe an experiment to nickel plate a copper key. You are provided with the following items.

6 V bulb and holder

6 V battery and connecting wires

250 cm^3 beaker

steel wool/sandpaper

copper key

distilled water

nickel rod

solid nickel(II) sulphate, NiSO_4



You can use a labelled diagram to help you answer the question.

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.....[5]

Topic 6

07s6

7 When cement powder is added to water a reaction takes place.

(a) Describe an experiment to show that this reaction is exothermic.

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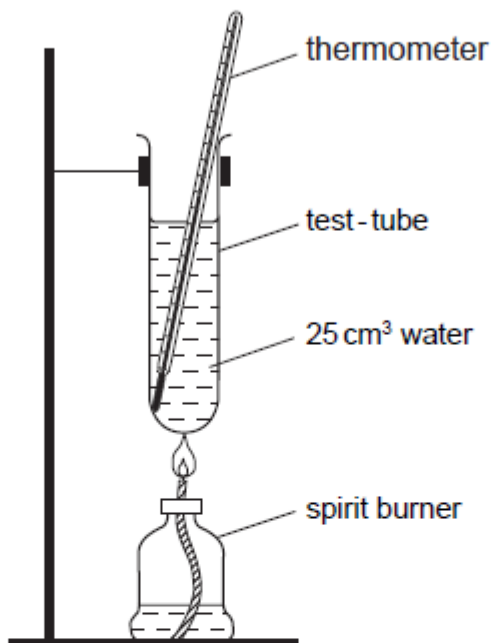
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.....[4]



- 7 Diesel is a liquid fuel obtained from crude oil. Biodiesel is a fuel made from oil obtained from the seeds of plants such as sunflowers.

Using the apparatus below plan an experiment to investigate which of these two fuels produces more energy.



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..... [6]



8 Is manganese(IV) oxide a catalyst?

A catalyst is a substance that speeds up a chemical reaction and remains unchanged.

Hydrogen peroxide, H_2O_2 breaks down to form oxygen. This reaction is very slow without a catalyst. Describe an experiment to show that manganese(IV) oxide is a catalyst for this reaction.

You are provided with the following items.

Hydrogen peroxide solution

Manganese(IV) oxide

Measuring cylinder

Balance

Beaker

Filtration apparatus

Splints/Bunsen burner

Distilled water

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[6]



05s6

- 8 An aqueous solution of hydrogen peroxide decomposes very slowly to form oxygen. The speed of decomposition can be increased by using a catalyst. Two possible catalysts are the solids copper(II) oxide and chromium(III) oxide.

Plan an investigation to find out which of these two oxides is the better catalyst for this decomposition.

The space below can be used for a diagram.

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..... [6]

Topic 8

03s6

- 6 Beach sand is a mixture of sand and broken shells (calcium carbonate). Calcium carbonate reacts with dilute hydrochloric acid to form a solution of calcium chloride.

Plan an investigation to find out the percentage of shell material in a given sample of beach sand.

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..... [6]



- 6 The label below is from a bottle of concentrated lemon drink.

Concentrated lemon drink
Ingredients: Water, sugar, citric acid, preservatives, potassium sorbate
(artificial sweetener). Yellow colourings E102 and E104.

- (a) What is meant by the term *concentrated*?

..... [1]

- (b) Predict the pH of the lemon drink.

..... [1]

- (c) Describe an experiment to show that two different yellow colourings are present in the drink.

[4]



05w6

- 7 Some plants do not grow well in acidic soil.
A farmer gives you a small sample of soil from a corner of one of his fields.

(a) Plan an investigation to find out the pH of the soil sample.

You are provided with Universal Indicator solution and common laboratory apparatus.

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..... [5]

(b) Why would further experiments be necessary to inform the farmer which plants should be grown in each of his fields?

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..... [2]

06s6

- 6 The diagram shows two bottles of liquid oven cleaner.



The oven cleaners contain sodium hydroxide solution. Plan an investigation to show which oven cleaner contains the highest concentration of sodium hydroxide.



6 Acid base indicators

Indicators are used to identify acids and bases.
Indicators can be obtained from berries and other fruits.

(a) Plan an experiment to obtain an aqueous solution of an indicator from some berries.

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..... [3]

(b) Plan an experiment to use the indicator solution to show that it is an effective indicator.

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..... [3]

[Total: 6]



Topic 10

10s6

- 7 Malachite is a naturally occurring form of copper carbonate. Outline how a sample of copper metal could be obtained from large lumps of malachite in the laboratory. Copper is one of the least reactive metals. Your answer should include any chemicals used and conditions.

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[6]

[Total: 6]

Topic 11

02w6

7

FASTGROW FERTILISER

Fertilisers are used to increase the growth of plants. Fertilisers have to dissolve in water if they are to be used by plants.

Plan an experiment to find the solubility, in $\text{g}/100 \text{ cm}^3$, of FASTGROW fertiliser at 30°C .

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[6]



STOP RUST!

Solutions of chemicals known as corrosion inhibitors are added to the water in steel radiators to reduce rust.

You are provided with three different bottles of liquid corrosion inhibitors, **R**, **S** and **T**, and some steel nails.

Plan an experiment to test if these inhibitors prevent the corrosion of steel and which of these inhibitors is the most effective.

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..... [7]

[Total: 7]

Topic 12

03w6

- 6 Sulphur dioxide gas is a common pollutant formed when fossil fuels burn in air. Sulphur dioxide can be detected by using an acidic solution of potassium dichromate(VI). The dichromate solution changes colour from orange to green when a certain amount of sulphur dioxide has reacted with it.

Plan an experiment to investigate which of three different samples of coal produces most sulphur dioxide.

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Which is the more pure - limestone or marble?

Calcium carbonate is found in limestone and in marble. All carbonates react with hydrochloric acid to form chlorides. Calcium carbonate is insoluble in water but calcium chloride is water soluble.

Most impurities in limestone and marble are insoluble.

Plan an experiment to find out which of limestone and marble contain most insoluble impurities. You are provided with common laboratory apparatus.

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..... [7]

[Total: 7]



MARK SCHEMES

Topic 1 Mark Scheme

04w6

- 7 chromatography (1) apply inks/spots to paper (1)
organic solvent/water (1) rises up paper (1)
check heights/positions of spots (1) compare to find ink from banknote (1) (6)
- N.B. all marks can be obtained from a diagram

06w6

- 6 (a) paint sample + water(1) filter(1) solid residue(1) max 2 [2]
(b) solid + organic solvent(1) add to paper(1)
chromatography(1) use of solvent(1) description of spots(1)
max 4 NB use of water = max 1 for chromatography [4]
(c) (i) apply paint, start timer(1) method of checking dry, note time(1)
no painting = 0 [2]
(ii) correct method(1) e.g. hair drier/wind/fan/increase temperature.
NOT catalyst. [1]

09w6

- 7 (a) pestle/mortar/solvent/sand (any three) [3]
ignore water and/or heat
- (b) NB marks can be obtained from a diagram
chromatography or chromatogram (1)
paper (1)
apply spot/extract to paper (1)
description or name of solvent used (1)
and separation e.g. spots on paper (1) (max 4) [4]
- If water used as solvent (max 3)
If paper dipped into extract (max 3)
If method would not work (max 2)

11w6

- 6 measured volume of seawater (1)
using measuring cylinder (1)
into evaporating dish/beaker (1)
pre-weighed (1)
evaporate/heat (1)
to dryness/constant mass (1)
re-weigh (1)
indication of calculation method (1) max [6]
- would not work = max 0

Topic 5 Mark Scheme

02s6



8

circuit set up (1) bulb (1)
 copper key cleaned with sandpaper/steel wool (1)
 copper key is ^{cathode} anode (+) (1) } wrong way round = (1)
 nickel rod is ^{anode} cathode (-) (1)
 solution of nickel sulphate in beaker (1)

All marks could be obtained from a diagram.
 Max 5

6
5

Topic 6 Mark Scheme

07s6

- 7 (a) initial temperature of cold water or cement (1)
 add cement (1)
 using thermometer / in beaker etc. (1)
 measure temperature (1)
 temperature rise (2) max 4

[4]

NB
 no water = 0
 no cement = 0
 use of heat = 0
 wrong chemicals = 0
 would not work = 0

- (b) sodium hydroxide (1) white precipitate (1)
 or flame test (1) red (1)

[2]

[Total: 6]

07w6

- 7 same volume/mass of fuel/idea of fair test (1)
 initial temperature of water (1)
 burn/ignite fuel (1)
 record temperature of water (1)
 repeat (1)
 compare e.g. greatest temperature rise in specified time shows better fuel (1)

[6]

Topic 7 Mark Scheme

04s6

- | | | |
|---|---|---|
| 8 | Add known mass of manganese oxide | 1 |
| | To (measured volume of) hydrogen peroxide | 1 |
| | Bubbles | 1 |
| | Test gas with glowing splint | 1 |
| | Result | 1 |
| | Filter | 1 |
| | Dry solid | 1 |
| | Reweigh and compare | 1 |
| | (max 6) | |

[6]

05s6



- 8 same amount/measured volume of peroxide (1)
 add known mass of metal oxide (1)
 time (1) measure volume of oxygen (1)
 repeat with other oxide (1) compare/conclusion (1) [6]
 method will not work = 0

Topic 8 Mark Scheme

03s6

- 6 Known mass of beach sand (1)
 add excess (1) dilute hydrochloric acid (1)
 filter (1) wash (1) dry (1) residue
 and weigh sand (1) working out result (1)
 max 6 of 8 [6]

05s6

- 6 (a) no/little water present/little water implied (1) [1]
 (b) any value less than 7 (1) [1]
 (c) chromatography (1) apply to paper (1) use of solvent (1)
 description of two yellow spots (1) [4]
 paper in drink = max 2

05w6

- 7 (a) soil sample + water (1)
 stir/heat (1)
 filter (1)
 add Universal Indicator (1)
 chart (1) [5]
 (b) more samples (1)
 different parts of field (1) [2]

06s6

- 6 Measured volume of oven cleaner (1)
 Add indicator/named indicator (1)
 Add named acid (1), from a burette/pipette (1)
 Until colour change/end point (1), measure/record volume of acid (1)
 Repeat with other cleaner (1), compare (1)

Max 6

[6]

07s6



- 7 (a) initial temperature of cold water or cement (1)
 add cement (1)
 using thermometer / in beaker etc. (1)
 measure temperature (1)
 temperature rise (2) max 4 [4]
- NB
 no water = 0
 no cement = 0
 use of heat = 0
 wrong chemicals = 0
 would not work = 0
- (b) sodium hydroxide (1) white precipitate (1) [2]
 or flame test (1) red (1)

[Total: 6]

08w6

- 7 (a) heat/warm the acid (1)
 add excess oxide or description of no more solid reacting (1)
 filter/decant (1) [3]
- (b) heat qualified e.g. to crystallising point or description of e.g. using glass rod/leave it to evaporate (1)
 cool to form crystals (1)
 filter off crystals (1)
 method of drying crystals e.g. pressed filter papers/oven at low temperature (1) [max 3]

[Total: 6]

09s6

- 6 (a) add water (1)
 crush/mix/warm (1)
 filter/decant or pipette off liquid/sieve (1) [3]
- (b) add indicator solution to acid (and note colour) (1)
 add indicator solution to alkali or named alkali (and note colour) (1) not base
 conclusion e.g. colours should be different owtte (1) [3]

Topic 10 Mark Scheme

10s6

- 7 crush malachite (1) using pestle/mortar (1) add named acid (1)
 solution formed (1) add magnesium/zinc/iron (1) displacement (1)
 obtain copper/filter (1) max [6] [6]
- or first two steps (2) add carbon/reactive metal/hydrogen (1) heat (1)
 displace/redox (1) until goes pink (1) obtain copper (1)
 or first four steps (4) electrolyse solution (1) copper deposited at cathode (1)
 obtain copper (1) NB If malachite anode used allow max 3 even if it would not work.

Topic 11 Mark Scheme

02w6



7	known mass of fertilizer (1) Add known volume of water (1) Warm to 30°C (1) Stir (1) Filter (1) / Evaporate to dryness Dry and weigh residue (1) Work out solubility (1) / conclusion	max 6 <hr/> 6 <hr/> 12
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12s6

- 6 steel nail(s) in test-tube/suitable glass container (1)
 x cm³ (1)
 water (1) no water = max 3
 known volume of inhibitor added (1)
 observe effect after suitable time (1) note: minimum time = 1 day
 repeat using other inhibitors (1)
 observe/comparison of results (1)

[7]

[Total: 7]

Topic 12 Mark Scheme

03w6

- | | | |
|---|---|----------------|
| 6 | Weigh coal sample (1) same amount
<u>Burn</u> coal (1)
Pass gas or diagram to show (1)
Through acid/dichromate (1)
Use of timer (1)
Record time for colour change (1)
Repeat/compare with other samples (1) | Max 6

6 |
|---|---|----------------|

Topic 13 Mark Scheme

12w6

- 6 any seven from:
 equal weight/mass of limestone and marble (1)
 crush (1)
 add excess of water (1) hydrochloric acid (1)
 stir (1)
 filter mixture (1)
 dry (1)
 reweigh (1)
 conclusion (1)

[7]

