GCSE Chemistry



Required Practical Answer Book

|  |  |  |
| --- | --- | --- |
| **Name:** | **Class:** | **Teacher:** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Practical 1**  **Making Salts** | **/ 13** | **Practical 4**  **Chromatography** | **/ 13** |
| **Practical 2**  **Temperature Changes** | **/ 15** | **Practical 5**  **Water Purification** | **/ 12** |
| **Practical 3**  **Rates of Reaction** | **/ 19** | **Practical 6**  **Electrolysis** | **/ 16** |

**Required Practical 1: Making Salts**

**Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen**

**burner to heat dilute acid and a water bath or electric heater to evaporate the solution.**

|  |  |
| --- | --- |
| Question 1 | (a)     s  **1**  l  *Answers****must****be in the correct order.*  **1**  (b)     A gas was lost from the flask  **1**  (c)     **Level 3 (5–6 marks):**  A coherent method is described with relevant detail, and in correct sequence which demonstrates a broad understanding of the relevant scientific techniques and procedures. The steps in the method are logically ordered. The method would lead to the production of valid results.  **Level 2 (3–4 marks):**  The bulk of the method is described with mostly relevant detail, which demonstrates a reasonable understanding of the relevant scientific techniques and procedures. The method may not be in a completely logical sequence and may be missing some detail.  **Level 1 (1–2 marks):**  Simple statements are made which demonstrate some understanding of some of the relevant scientific techniques and procedures. The response may lack a logical structure and would not lead to the production of valid results.  **0 marks:**  No relevant content.  **Indicative content**  •        sulfuric acid in beaker (or similar)  •        add copper carbonate one spatula at a time  •        until copper carbonate is in excess or until no more effervescence occurs \*  •        filter using filter paper and funnel  •        filter excess copper carbonate  •        pour solution into evaporating basin / dish  •        heat using Bunsen burner  •        leave to crystallise / leave for water to evaporate / boil off water  •        decant solution  •        pat dry (using filter paper)  •        wear safety spectacles / goggles  \*Students. may choose to use a named indicator until it turns a neutral colour, record the number of spatulas of copper carbonate added then repeat without the indicator.  **6**  (d)     Total mass of reactants = 221.5  **1**  159.5  221.5  *allow ecf from step 1*  **1**  72.0 (%)  **1**  *allow 72.0 with no working shown for****3****marks*  (e)     any **one** from:  •        Important for sustainable development  •        Economic reasons  •        Waste products may be pollutants / greenhouse gases  **1** |

**Required Practical 2: Temperature Changes**

**Investigate the variables that affect temperature changes in reacting solutions such as, e.g. acid plus metals, acid plus carbonates, neutralisations, displacement of metals.**

|  |  |
| --- | --- |
| Question 1 | (a)     any **two** from:  •        concentration / volume of dilute hydrochloric acid  •        mass of metal powder  •        surface area of metal powder  •        stirring (of any) / rate of stirring  *allow reacted for the same length of time*  **2**  (b)     4.2 °C  *allow Magnesium Test 2*  **1**  and any **one** from:  •        lower mass of magnesium added  •        surface area of magnesium too low  •        magnesium coated in magnesium oxide (so took a while to start reacting)  •        not stirred  •        not stirred as quickly as the other metals  •        not reacted for as long a time as the other metals  *allow reason for break in circuit*  **1**  (c)     17.4(°C)  **1**  (d)     bubbles of gas  **1**  more (bubbles) seen with calcium than other metals  *allow any correct comparison between two metals*  **1**  (e)     any value between 7.9 °C and 12.3 °C  **1** |
| Question 2 | (a)     (i)      5.75 **or** 5.8  *correct answer with or without working gains****2****marks*  *correct working showing addition of any four results and division by 4 gains****1****mark*  ***OR***  *6(.04) for****1****mark*  **2**  (ii)     use a polystyrene cup **or** lid  *accept insulate the beaker*  **1**  to prevent energy/heat gain  *accept to prevent energy/heat transfer*  *do****not****accept energy/heat loss*  **OR**  use a digital thermometer  *allow use a data logger*  easier to read (to 0.1°C)  **1**  (b)     (as mass increases) the final temperature increases  **1**  then stays constant  **1**  correct reference to a value above 8 g up to and including 10 g as mass when the trend changes  **1** |

**Required Practical 3: Rates of Reaction**

**Investigate how changes in concentration affect the rates of reactions by both measuring the volume of a gas produced and monitoring a change in colour or turbidity.**

|  |  |
| --- | --- |
| Question 1 | (a)     36 cm3  **1**  (b)     all points correct  *± ½ small square*  **2**  *allow****1****mark if 6 or 7 of the points are correct*  2 best fit lines drawn  *must not deviate towards anomalous point*  **2**  *allow****1****mark if 1 line correct*  (c)     The bung was not pushed in firmly enough.  **1**  The measuring cylinder was not completely over the delivery tube.  **1**  (d)     as mass of lithium carbonate increases volume of gas produced increases  **1**  linear / (directly) proportional  **1**  (e)     A gas / carbon dioxide is produced.  *allow because the air in the tube expands*  **1**  (f)     any **one** from:  •        Potassium carbonate does not decompose to produce carbon dioxide / a gas.  •        Potassium carbonate does not decompose at the temperature of the Bunsen burner **or** the Bunsen burner is not hot enough to decompose potassium carbonate.  •        When potassium carbonate decomposes a gas is not formed.  **1** |
| Question 2 | (a)     because sulfur / S (forms)  (a)     sulfur dioxide  *accept SO2*  **1**  (b)     (i)      curved line of best fit between the 4 non-anomalous points  **1**  (ii)     temperature was lower (than 40 °C)  *accept student missed the moment when the cross disappeared*  *accept smaller volume of acid or acid more dilute*  **1**  (iii)     0.005 **or** 1/200  *correct answer with or without working gains****2****marks*  *if answer incorrect, allow****1****mark for 0.32 / 64*  **2**  (iv)     The particles move faster.  **1**  The particles collide with more energy.  **1**  (v)     activation  **1** |

**Required Practical 4: Chromatography**

**Investigate how paper chromatography can be used to separate and tell the difference between coloured substances.**

|  |  |
| --- | --- |
| Question 1 | (a)     The start line was drawn in ink  **1**  The water level was above the spots  **1**  (b)     3  **1**  (c)     **A**  **1**  (d)     *(distance moved by dye A)* 38 (mm)  *allow values in range 36-40*  **1**  *(distance from start line to solvent front)*  102 (mm)  *allow values in range 101-103*  **1**  https://app.doublestruck.eu/content/AG_CHM/HTML/M/MSP182F04_files/img01.png  *allow ecf from Table 1*  **1**  0.37254 …  *allow values in range 0.35 − 0.39*  **1**  0.37  **1**  *accept 0.37 with no working shown for****5****marks* |
| Question 2 | (a)    additive  **1**  (b)     colour 3 is a mixture of colours 1 and 2  any **two** from:  *accept E-number or additive instead of colour*  *ignore comments about height / level*  **1**  •        colour 1 is made up of only one colour / dye  •        colour 2 is made up of only one colour / dye  •        colour 3 is made up of two colours / dyes  **or**  more colours (than colours 1 and 2)  **2** |

**Required Practical 5: Water Purification**

**Analysis and purification of water samples from different sources. To include pH measurement, removal of dissolved solids and distillation.**

|  |  |
| --- | --- |
| Question 1 | (a) *(as part of glassware attached to bung)*  salt solution in (conical) flask  *allow suitable alternative equipment, eg boiling tube*  **1**  *(at end of delivery tube)*  pure water in test tube which must not be sealed  *allow suitable alternative equipment, eg, beaker, condenser*  **1**  heat source (to heat container holding salt solution)  **1**  *if no other mark obtained allow for****1****mark suitable equipment drawn as part of glassware attached to bung****and****at end of delivery tube*  (b)     determine boiling point  **1**  should be at a fixed temperature 100°C  *allow should be 100°C*  *allow if impure will boil at a temperature over 100°C*  **1**  (c)     high energy requirement  **1** |
| Question 2 | (a)     any **one** from:  •        heat  •        stir  **1**  (b)     filter  *accept use a centrifuge*  *accept leave longer (to settle)*  **1**  (c)     any **one** from:  •        wear safety spectacles  •        wear an apron  **1**  (d)     evaporation at **A**  **1**  condensation at **B**  **1**  (e)     100  **1** |

**Required Practical 6: Electrolysis**

**Investigate what happens when aqueous solutions are electrolysed using inert electrodes.**

|  |  |
| --- | --- |
| Question 1 | (a)     (i)      economical  **1**  (ii)     phytomining  **1**  (iii)    carbon dioxide  **1**  (b)     (i)      copper / Cu  **1**  iron sulfate / FeSO4  **1**  (ii)     copper / ions have a positive charge  *it = copper ions*  *allow copper ions have a different charge*  *accept copper / ions are free to move*  *accept to gain electrons*  *accept copper / ions are attracted to the negative electrode****or****opposite charges attract*  **1**  (c)     any **two** from:  *ignore not biodegradable or does not decay*  •        copper ores are limited / running out  *allow copper is running out*  •        copper can be recycled  •        copper can be reused  •        copper is expensive  •        landfill sites are filling up  •        copper compounds are toxic  *allow copper is toxic*  **2** |
| Question 2 | (a)     substance brokendown / separates / splits into elements  by electric current / electricity  ions free to move e.g. when molten / in solution  *allow 1 mark for “a substance that conducts electricity”*  **max 2**  (b)     (i)      copper / Cu  **1**  (ii)     oxygen /O2  *allow CO2*  **1**  (c)     tube over electrode  full of CuSO4(aq) / water  *allow sulphuric acid / sensible electrolyte*  ***not****any other liquid / using a syringe*  **2**  (d)     Cu2+ ions removed / less Cu2+  ***not****copper sulphate removed*  *allow 1 mark for “copper removed / less copper”*  **2** |