

**FORM FOUR TRIAL 2, 2019**

**Kenya Certificate of Secondary Education**

**233/1 CHEMISTRY (Theory)**

**PAPER ONE**

**TIME: 2HRS**

**INSTRUCTIONS TO CANDIDATES**

1. Write your name and admission number in the spaces provided above
2. Sign and write the date of examination in the spaces provided
3. Electronic calculators may be used.
4. All working must be clearly shown where necessary

**FOR EXAMINERS USE ONLY**

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| QUESTION | MAXIMUM SCORE | CANDIDATE SCORE |
|  | 81-280 |  |

1. The table below shows pH values of solutions ABC and D

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Solution | A | B | C | D |
| pH value | 1 | 7 | 10 | 13 |

1. Give solution that is;
2. Acidic (1mk)

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1. Weak base (1mk)

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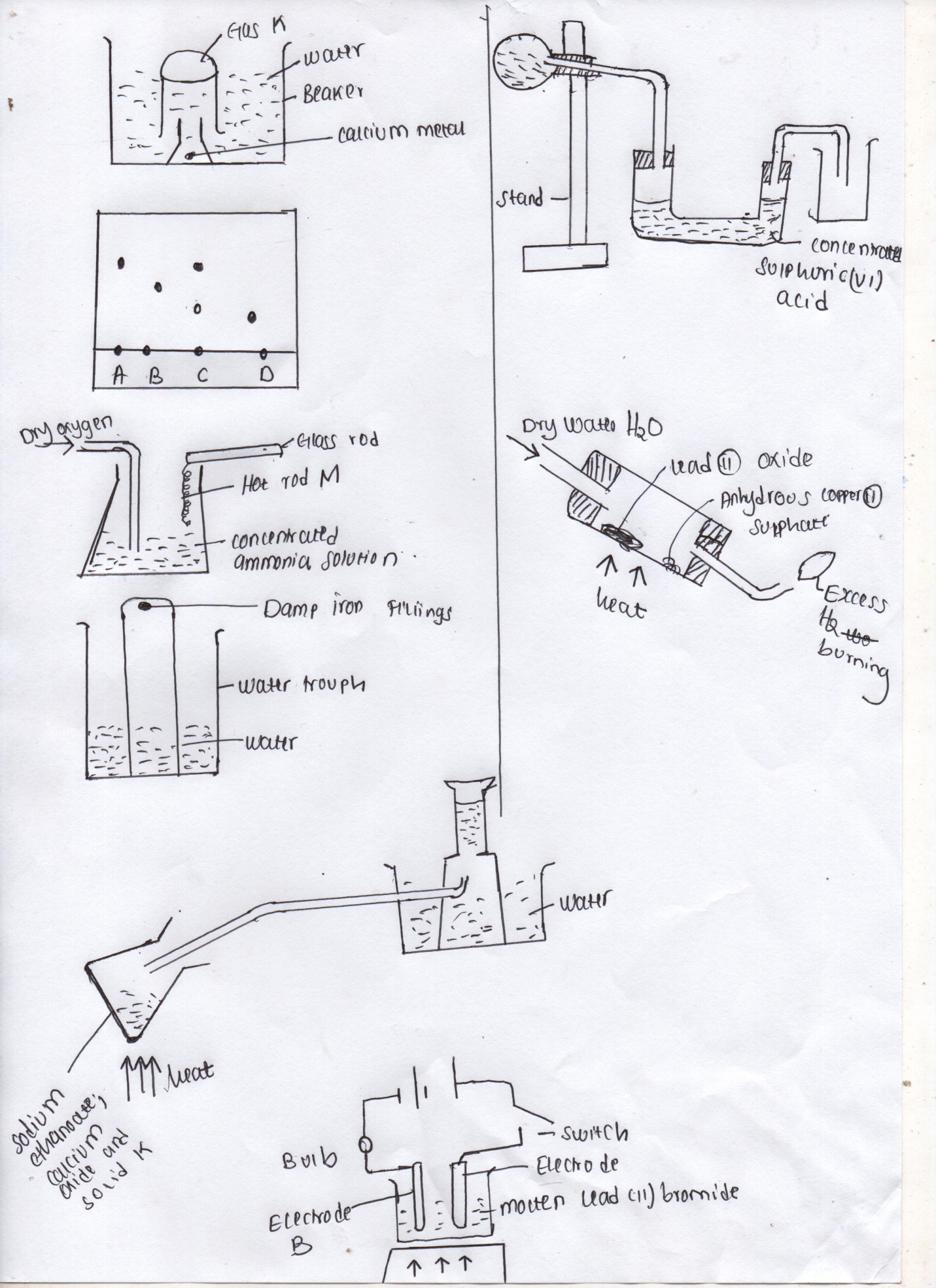
1. Neutral (1mk)

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1. Give the product formed when solution A react with a carbonate salt (1mk)

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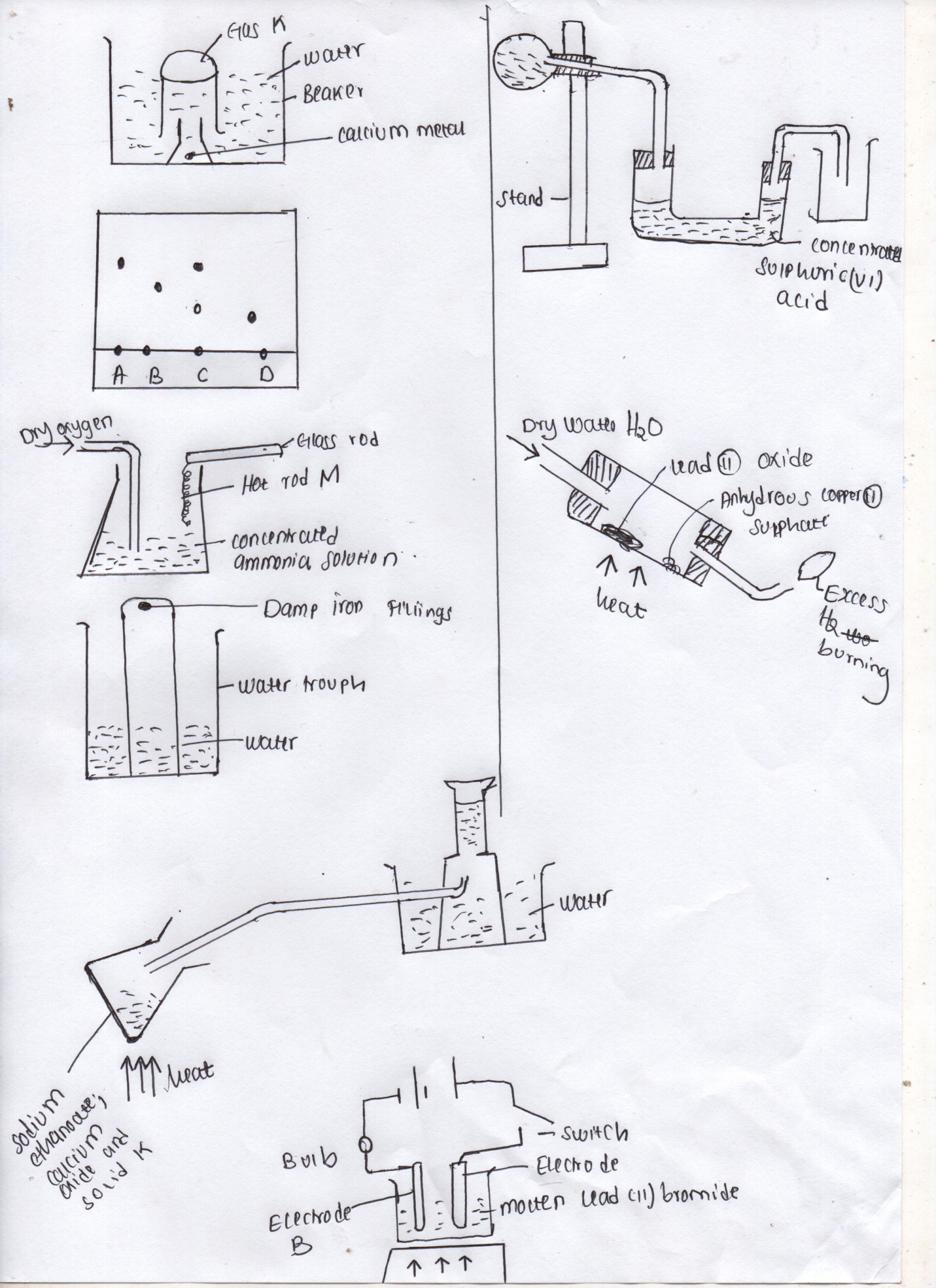
1. The set up below was used to collect gas K produced by the reaction between water and calcium metal



1. Name gas K (1mk)

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1. An organic compound P contains 64.9% carbon, 13.5 Hydrogen and the rest of the % is oxygen.
2. Determine empirical formula of the compound (3mks)
3. Determine the molecular formula given that the relative formula mass of P is 74 (1mk)
4. The diagram below shows spots of pure substances A, B and D on a chromatography paper. Spot C is that of the mixture.



1. On the diagram show the following
2. Baseline (½mk)
3. Solvent front (½mk)
4. Which substances are present in C (2mks)

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1. In a reaction 20cm3 of 0.1m sodium carbonate completely reacted with 13cm3 of dilute sulphuric (V) acid. Find h concentration of suphuric acid in moles per litres (3mks)
2. Using dots (·) and crosses (X) draw the structure of hydroxonium ion (H3O+) (2mks)
3. Study the information below and answer the questions that follows. Letters do not represent the actual symbol of element.

|  |  |  |
| --- | --- | --- |
| **Element** | **Atomic No** | **Ionization energy kJmol** |
| P | 4 | 1800 |
| Q | 12 | 1450 |
| R | 20 | 1150 |

1. What is the general name given to the group in which element P, Q and R belong? (1mk)

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1. Explain why P has highest ionization energy (2mks)

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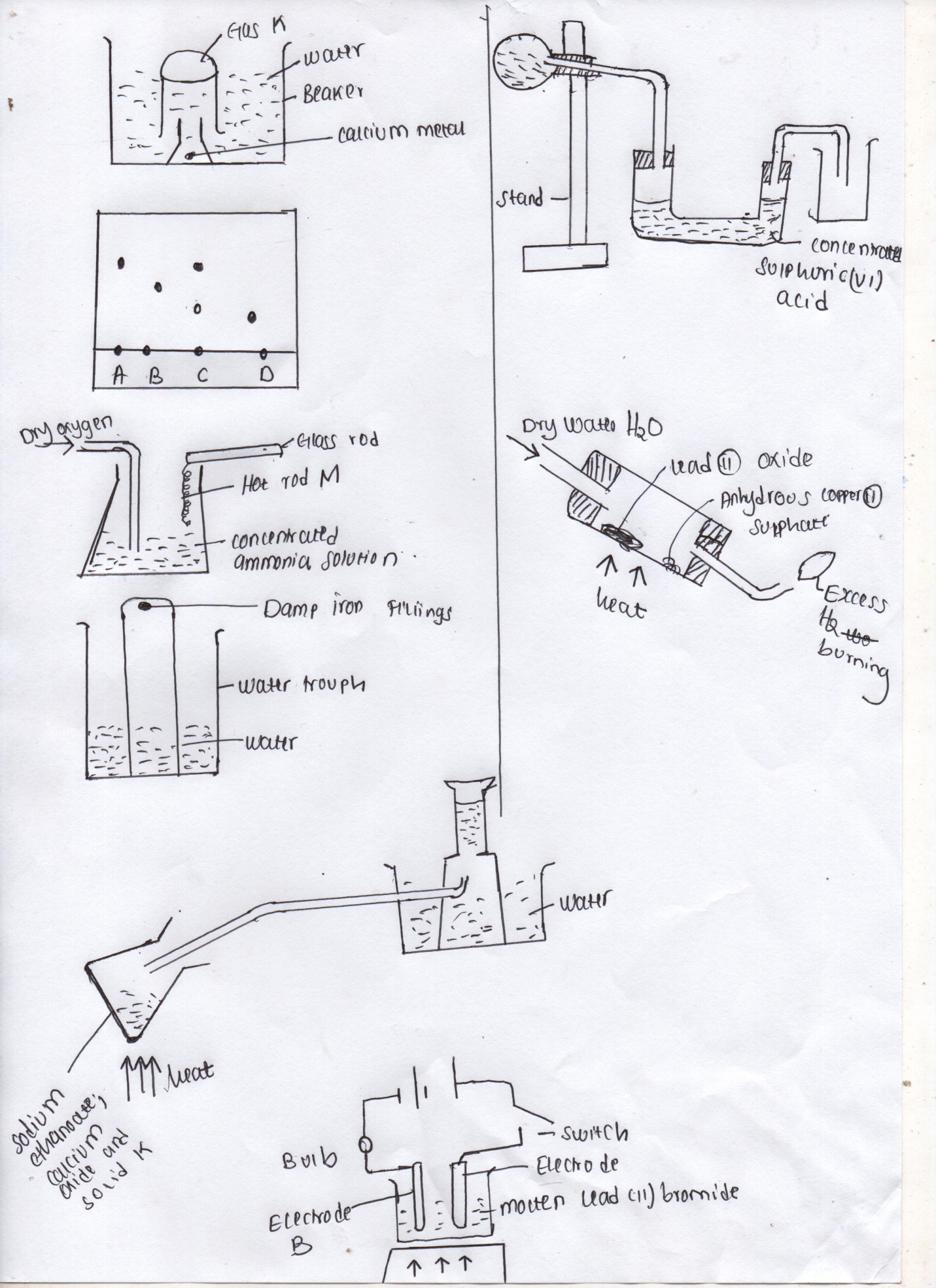
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1. Write a balanced chemical equation for the reaction between element Q and water

(1mk)

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1. The diagram below shows catalytic oxidation of ammonia gas. Use it to answer the questions that follows.



1. Name metal M (1mk)

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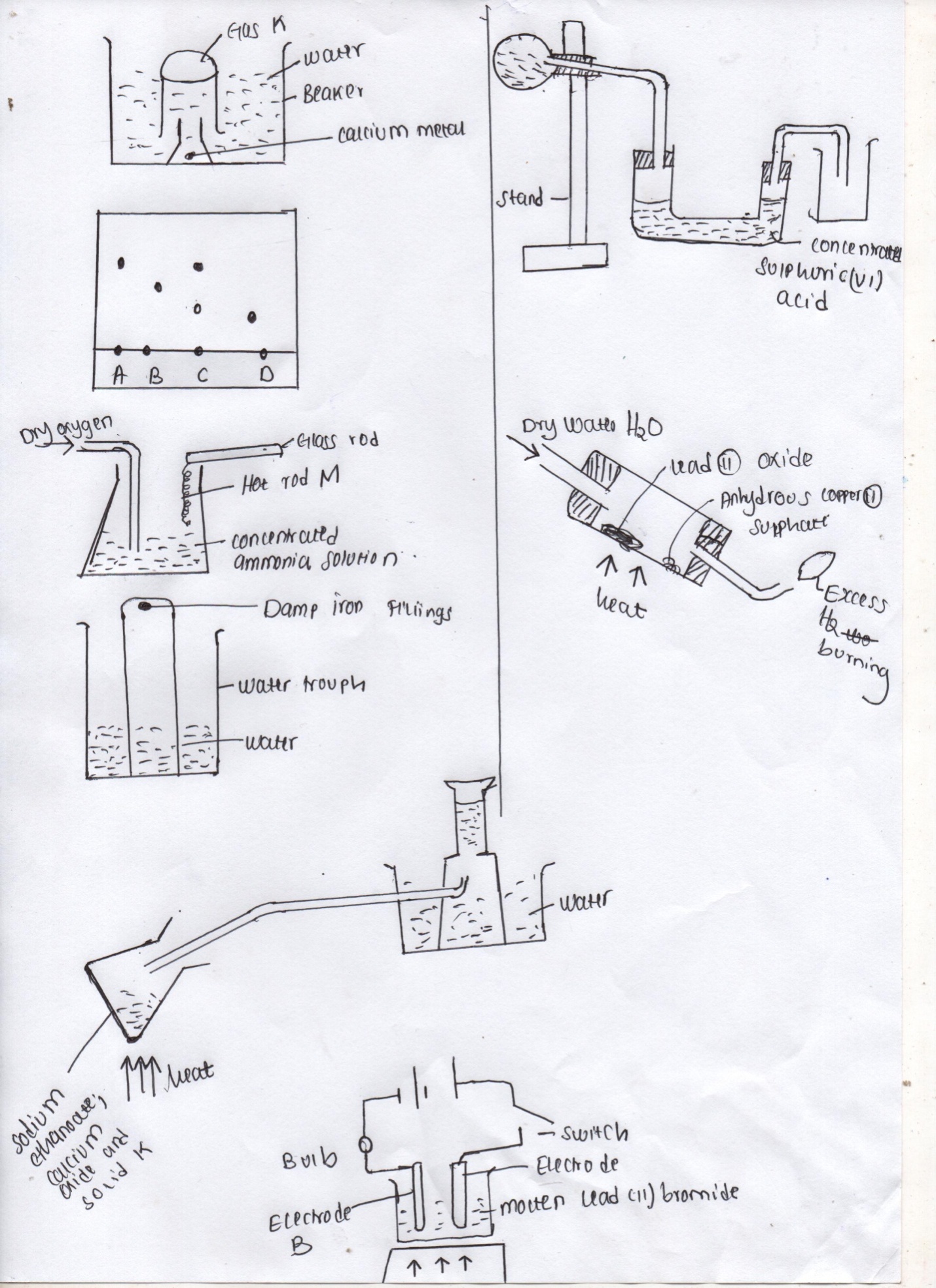
1. State and explain two observations made inside the flask (2mks)

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1. In an experiment a gas jar containing some damp iron fillings was inverted in a trough containing some water and the set up was left for 3 days.



1. Why was iron fillings moistened (1mk)

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1. State and explain observation made after 3 days (2mks)

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1. a) Distinguish between hygroscopy and efflorescence (2mks)

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b) Starting with lead (II) oxide, describe how you would prepare lead (II) sulphute (3mks)

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1. a) Define the term isotope (1mk)

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b) Chlorine gas has a mass of 35.5. It is made up of two isotope and . Determine the relative abundance of each isotope in the chlorine gas. (2mks)

1. Explain the reason why Aluminium is used for making utensils like sufuria (1mk)

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1. Describe a chemical test to differentiate between carbon (IV) oxide and carbon (II) oxide gas (2mks)

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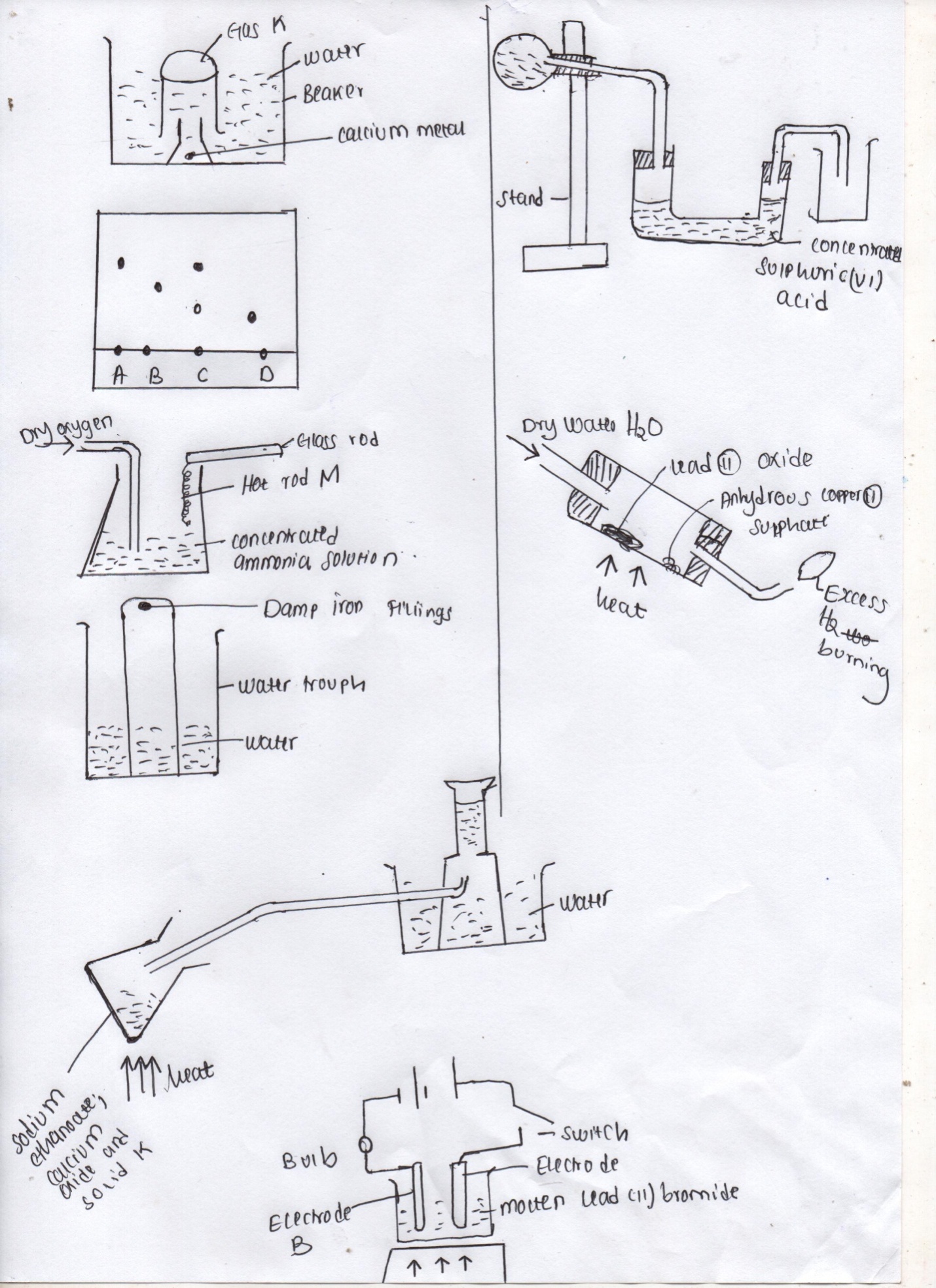
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1. i) State Graham’s law of diffusion (1mk)

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ii) 120cm3 of methane gas takes 30 seconds to diffuse through a certain membrane. Determine the rate of diffusion of surphure (IV) oxide gas through the same membrane (C=12, H=1, S=32, O=16) (3mks)

1. Study the set up below and answer the questions that follow

 Gas Q

Heat

Sodium ethanoate +calcium oxide +solid K

1. Name gas Q (1mk)

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1. Identify solid K (1mk)

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1. What is the purpose of calcium oxide in the experiment (1mk)

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1. Both ions and have an electron configuration of 2.8.8
2. Write the electron arrangement for:

Y …………………………………………………………………………………. (½mk)

Z …………………………………………………………………………………. (½mk)

1. What is the mass number of atom Z given that it has 20 neutrons (1mk)
2. Magnesium ribbon was burnt in air;
3. State the observation made (1mk)

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1. Write the equations for the reaction (2mks)

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1. a) Distinguish between a weak acid and a dilute acid (2mks)

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b) Giving a reason, identify an acid in the reverse reaction below (2mks)

H3O+ (aq) + NH3(g) NH4+ + H2O (l)

Acid ………………………………………………………………………………………………………. (½mk)

Reason …………………………………………………………………………………………………… (½mk)

1. What causes water hardness (1mk)

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1. a)Using ionic equation, explain how sodium carbonate removes permanent hardness (1mk)

b) State one disadvantage of using hardness in the boilers (1mk)

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1. Study the equation below

CH3CHClCHClCH3

1. Give the structural formula of Q (1mk)

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1. Name the type of reaction in the equation above (1mk)

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1. To which family of hydrocarbons does Q belong? (1mk)

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1. Consider the scheme below for allotropes of sulphur

Allotrope J Allotrope K

1. What is the significance of temperature 960C (1mk)

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1. Name allotrope J and K (2mks)

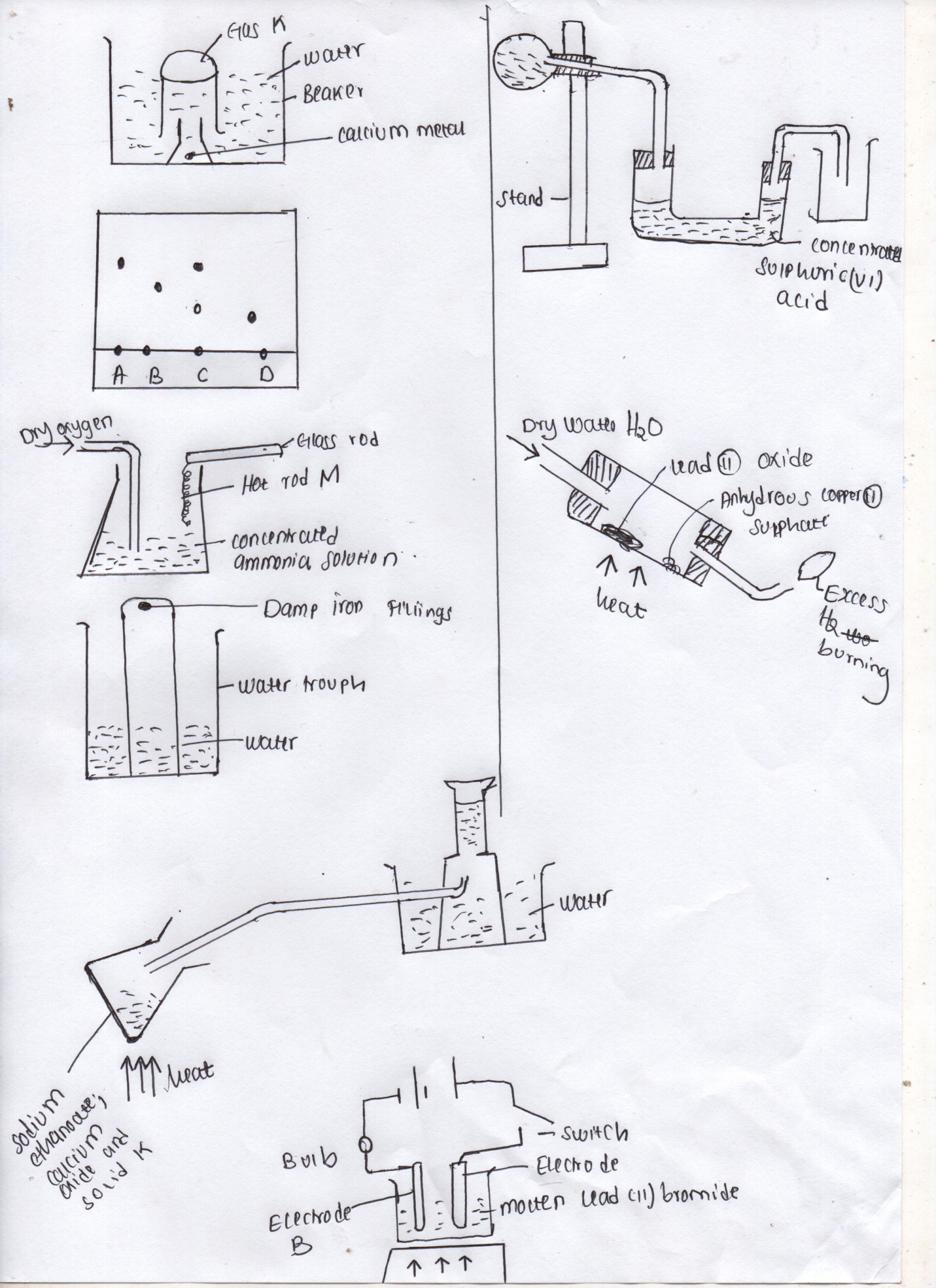
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1. In term of structure and bonding explain why Diamond is used in drilling and graphite used as a lubricant (2mks)
2. The table below gives the bond energies of some compounds.

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| --- | --- |
| **Bond** | **Bond energy kJ/mole** |
| H-H | 435 |
| Cl-Cl | 244 |
| H-Cl | 431 |

Calculate the enthalpy change for the reaction H2(g) + Cl2(g) 2HCl(g) (3mks)

1. 

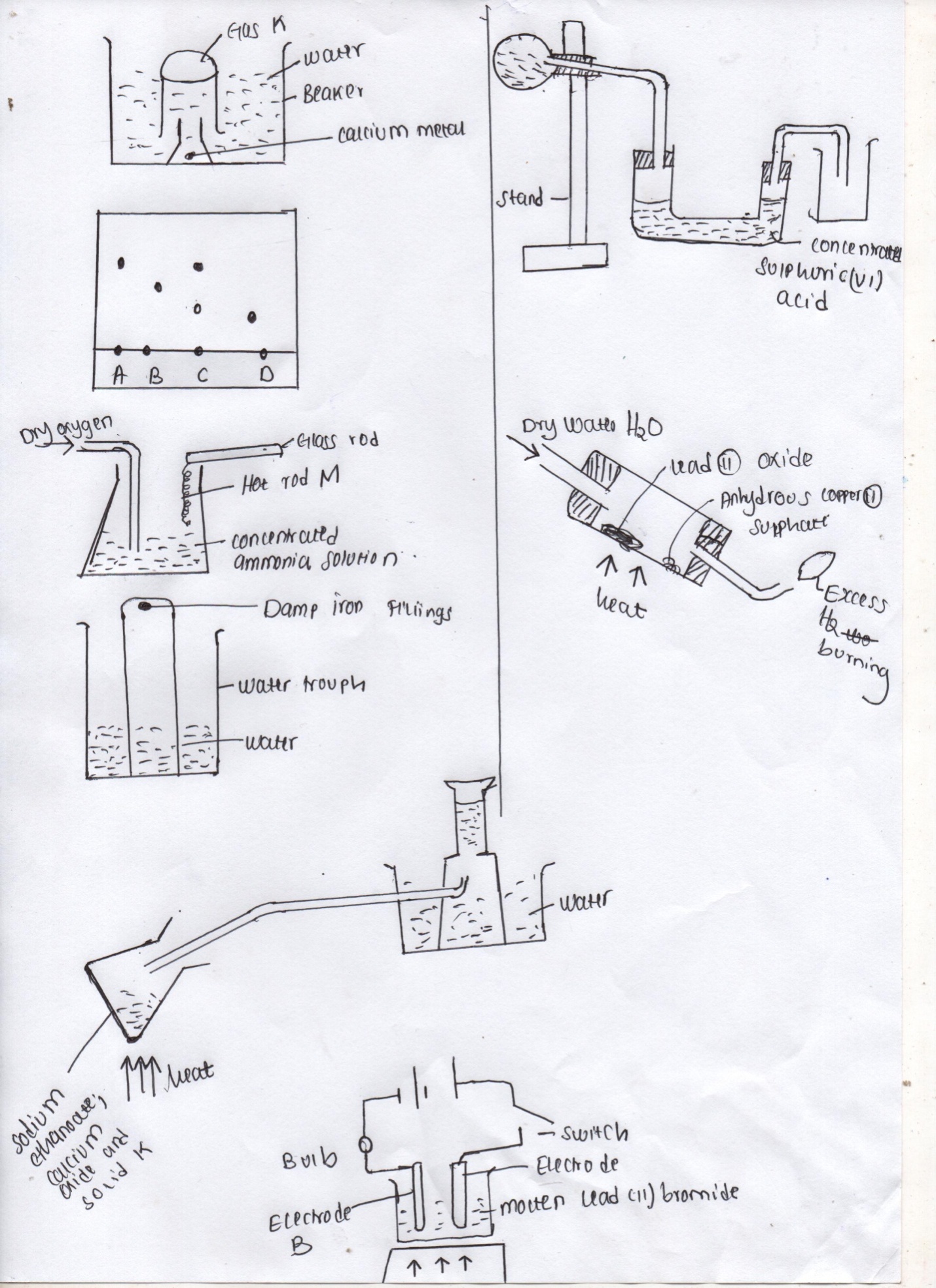
The diagram above shows the effect of electric current on lead (II) bromide. Study it and use it to answer the questions that follow.

1. On the diagram, Name electrodes A and B (2mks)
2. State the observations made at electrode A (1mk)

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1. Write the equation that takes place at electrode B (1mk)

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1. The diagram below represents the apparatus used to prepare and collect dry ammonia gas.

Ammonia chloride and KOH

1. State two mistakes in the set up of apparatus (2mks)

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1. Write an equation for the reaction apparatus (2mks)
2. The table below gives the solubilities of potassium bromide and potassium sulphate at 00C and 400C.

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| --- | --- | --- |
| **Substance** | **Solubility g/100 water at** | |
|  | **00C** | **400C** |
| Potassium bromide | 55 | 75 |
| Potassium sulphate | 10 | 12 |
|  |  |  |

When an aqueous mixture containing 60g of potassium bromide and 7g of potassium sulphate in 100g of water at 800C was cooled to 00C, some crystals were formed.

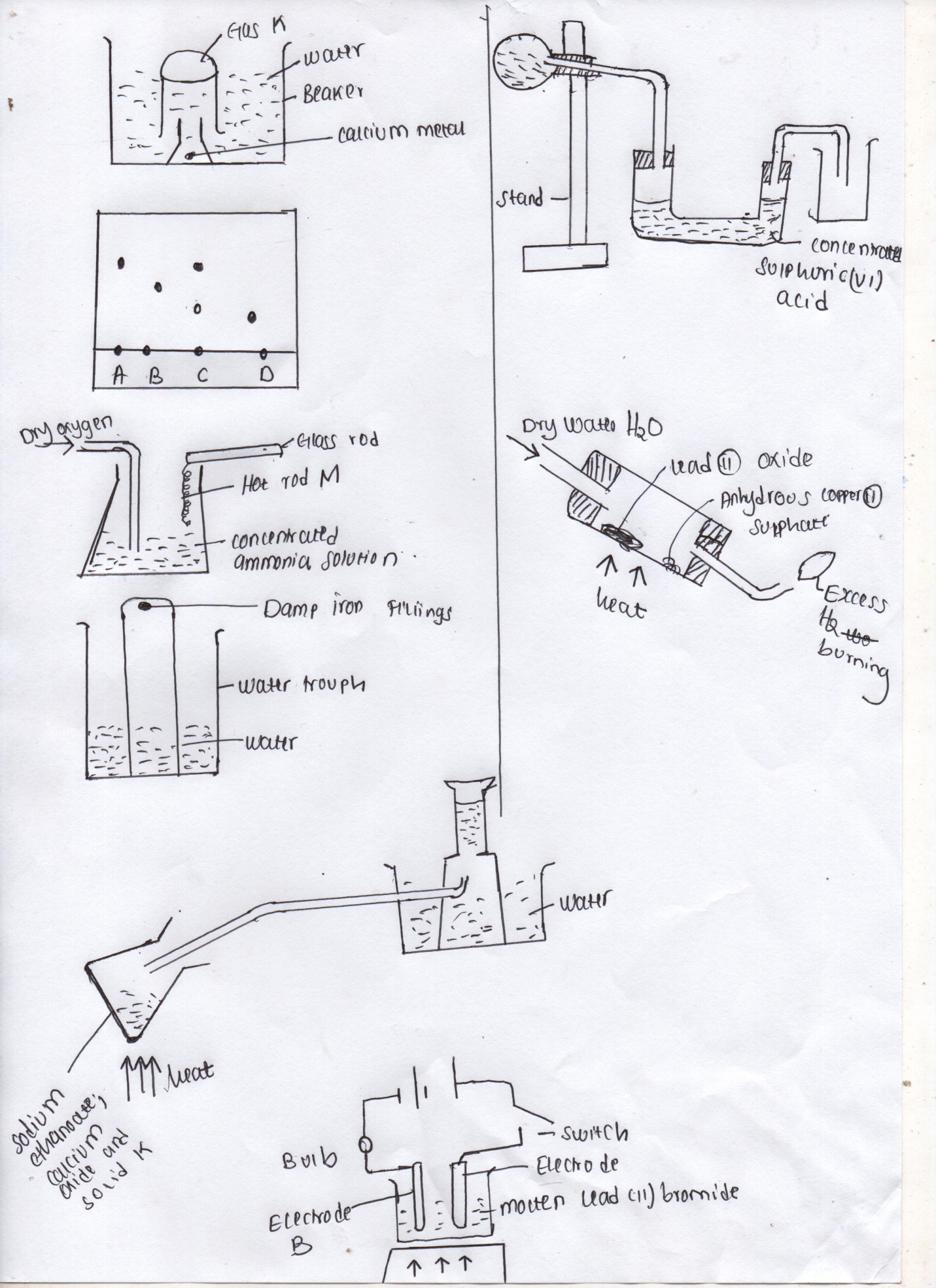
1. Identify the crystals (1mk)

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1. Determine the mass of crystals formed (1mk)
2. Name the method used to obtain the crystals (1mk)

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1. Study the diagram below



1. What is the observation made on anhydrous copper (II) sulphate (1mk)

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1. Write an aqueous for the reaction ,between hydrogen gas and lead (II) oxide (1mk)
2. What is the property of hydrogen gas being investigated above (1mk)

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