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1. Follow the instructions below and answer the questions which follows.
- a) A student added 1cm^3 of an aqueous solution of a cation into a test tube and added a few drops of dilute NaOH (aq) and observed a white chalky precipitate, name the cations that are likely to be present. [4 marks]

 - b) Excess dilute NaOH (aq) was added to (a) and there was formation of insoluble precipitate. Name the cation present. [2 marks]

 - c) A sample of an aqueous solution was added to 1cm^3 of dilute NH_3 (aq) solution no precipitate was formed and there was no evolution of gas. Name the cations that are likely to be present. [4 marks]

 - d) When a few drops of NaOH (aq) was added and warmed, there was evolution of gas. This gas was colourless and smells like urine. This gas also turns red litmus paper blue and gives a thick white fume with concentrated HCl (aq). Name this cation. [2 marks]

 - e) State four physical properties of oxygen. [8 marks]
2. Use this information to complete the table below,

Concentrated H_2SO_4 was added to solid samples as shown below. [10 marks]

Anion present in the solid	Observation
Cl^-	
	Evolution of violet I_2 vapour and rotten egg smell of H_2S gas
	Evolution of SO_2 gas
SO_4^{2-}	
CO_3^{2-}	

3. a) Hydrogen peroxide has become one of the chemicals preferred in the preparation of hand sanitizers according to world health organisation standards. In an experimental set up, draw and label the preparation of oxygen gas using hydrogen peroxide. [10 marks]

- b) write a balanced chemical equation for the reaction. [2 marks]
- c) state the chemical test for the gas [2 marks]
- d) describe how you will conduct the test stated in (c) above [2 marks]
- e) what method of delivery or collection was used to collect the hydrogen gas. [2 marks]
- f) write three properties of hydrogen gas. [6 marks]