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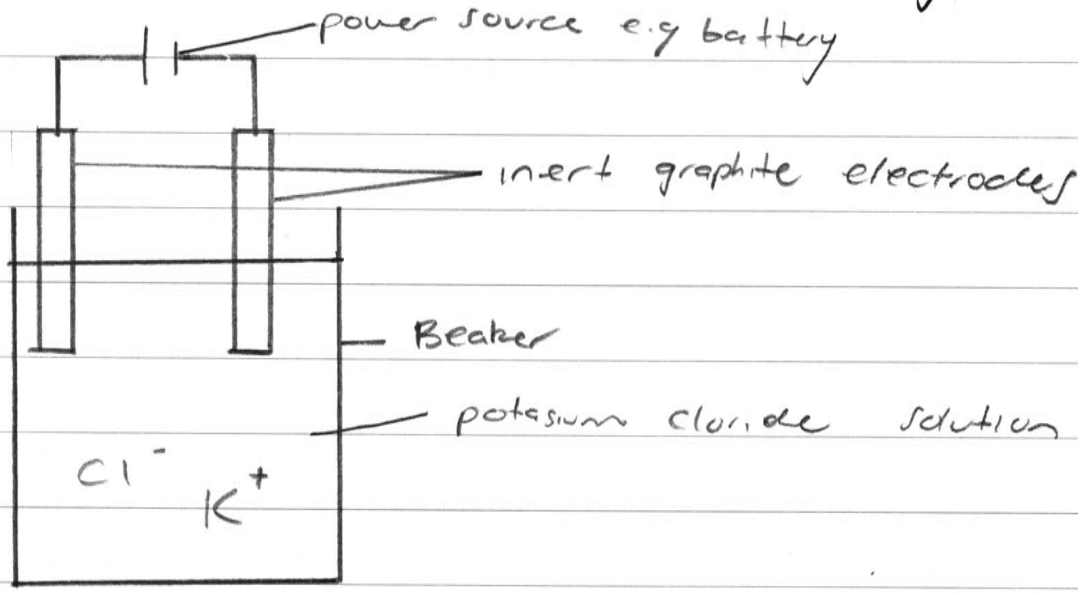
a) Due to the presence ~~and~~ of H_2O & O_2 with a suitable electrolyte (sea water) the metal hoops that encompass the buckets would incur large levels of corrosion. The wood would become ~~rotten~~ rotten as water would move into the cells & cause them to bloat & break the cell walls resulting in decay.

b) i)



$K_{(s)} \longrightarrow K^+_{(aq)} + e^-$ Oxidised 2.94 V

$\frac{1}{2} Cl_{2(aq)} + e^- \longrightarrow Cl^-_{(aq)}$ reduced 1.36 V

$\frac{1}{2} Cl_{2(aq)} + K_{(s)} \longrightarrow K^+ + Cl^-_{(aq)}$ = 1.58 V

i) By bubbling of ~~Cl~~ $Cl_{2(g)}$ ~~gas~~

ii)

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c) ~~Steel 1~~ All steels mentioned are alloys meaning they contain different elements with iron that give it specific qualities & properties for specific uses.

Steel 1 is just a common steel with with a large amount of Fe and a small amount of Carbon making it relatively mailable but with some degree of corrosion resistance.

Steel 2 has a larger percent of Carbon making it stiff and strong but & slightly more brittle.

Steel 3 consists mainly of iron again but a larger proportion of Carbon & Magnesium & Silicon this makes the metal stronger in its tensile strengths.

Steel 4 consists of iron Cromium & Ni this makes the metal stainless as it is not susceptible to corrosion.

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d) i) In order to investigate the corrosion of iron in relation to temperature, oxygen concentration & salt concentration the following conditions can be produced

- ~~pla~~ Temperature - place a small piece of iron in a small cup and fill with water ensuring the surface is ~~fitted~~ sealed with oil,
- place one cup in the refrigerator at 3°C
- place one cup in a cupboard at room temp 25°C
- place one cup under a heat lamp 40°C

- Oxygen concentration - place a small piece of ~~nickel~~ iron in a small cup, fill one cup with normal tap water, fill the second with water that has been boiled to remove oxygen and ~~fill~~ fill one cup with highly oxygenated water.

- Salt concentration - Fill one cup with iron in it with pure tap water, fill one cup with 3.5% salt concentration (sea water) and fill one cup with 7% salt concentration

- Leave all samples for 5 weeks and observe ~~record~~ extent of corrosion.

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ii) The salt concentration of the water could be reduced in a marine environment after periods of heavy rain and fresh water run off into the ocean.

e) Wooden & copper artefacts that have been immersed in water for at least 100 years would require various techniques in order to restore & conserve them. The wooden artifacts would have absorbed large amounts of H_2O & ions, to remove these the artefact is placed in a 2% NaOH bath with is not too concentrated as it destroys the artifact but over time draws out dissolved gases and ions. Copper artifacts can undergo electrolytic treatment where a mild piece of steel acts as a ~~cathode~~ anode while the copper is the ~~can~~ cathode, this helps to remove corrosion and replace ~~electrons~~ Cu^{2+} ions back to their solid form. Both copper artefacts and wooden artifacts undergo large amounts of washing with fresh water which done slowly to ensure no damage ~~to~~ is done while the wash removes rust and other substances. PTO.

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Wooden artefacts are often impregnated in a form of polyethylene glycol which is absorbed and solidified in the wood giving it strength and support. Both copper & wooden artefacts can be coated with a protective wax to stop further oxidation & decay, this wax is very innovative as it can be removed if new restoration techniques are developed in the future allowing for further improvements in the artefacts.

You may ask for an extra Writing Booklet if you need more space.

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