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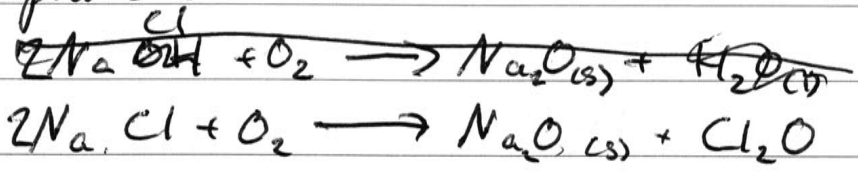
a) ~~mercury~~ cell diaphragm cell

Salt and water are mixed together to make brine. The brine travels across an electrolysis cell and releases chlorine gas as it decomposes. ~~The remaining products~~

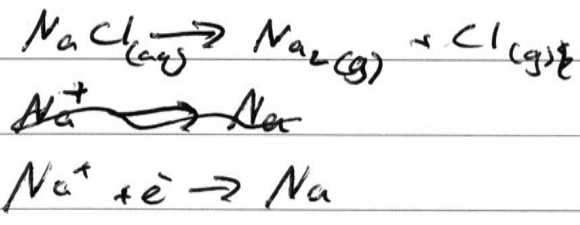
~~are~~ ~~then~~ ~~is~~ ~~decomposed~~ ~~again~~ ~~with~~ ~~water~~ ~~to~~ ~~create~~

The sodium amalgam then reacts with hydroxide after water has been decomposed to make hydrogen gas and hydroxide. This hydroxide then reacts with the sodium amalgam to create sodium hydroxide

b) The electrolysis of molten sodium hydroxide  
 occurs in the presence of oxygen  
 causing  $\text{Na}_2\text{O}$  sodium <sup>oxide</sup> hydroxide to be a  
 product.

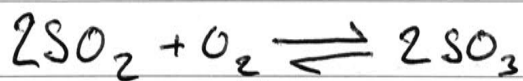


The electrolysis of aqueous sodium is done  
 in a vacuum so that no air is available to it



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c) i) ~~SO<sub>2</sub> ⇌ SO<sub>3</sub>~~



$$K = \frac{[\text{SO}_3]^2}{[\text{SO}_2]^2[\text{O}_2]}$$

$$K = \frac{[0.3]^2}{[0.5]^2[0.2]}$$

$$= \frac{0.209}{[0.25][0.2]}$$

$$= 1.8$$

ii) As there has been a disruption in the conditions of the equilibrium, this is as the reaction has been left at room temperature which has allowed for the temperature to fluctuate. This cause the shift as the reaction is endothermic ~~so~~ as the room has gotten hotter.

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

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d) i) Hydrochloric acid

ii) The reaction could ~~even~~ be carried out in a ~~not~~ school by only the teacher having the concentrated HCl. This is to avoid getting it on a student's skin or clothes. If this were to occur then excess HCl should be wiped off ~~and~~ before <sup>rinsing</sup> ~~away~~ under a tap.

e) Limestone is important in the Solvay process as it provides the reactants to also obtain the main product of  $\text{CO}_3^{2-}$ . There are several environmental problems associated with the use of limestone as a source. This is as limestone is not a renewable source. This is as limestone rocks take many years to form. Thus to obtain the limestone is another environmental impact as it involves open cut mining. This means that the entire surrounding landscape has to be destroyed to obtain the limestone as well as the use of heavy power gridding tools to dig and transport the limestone.

The Solvay process involves obtaining its products by completing several reactions to obtain the final product. These products can be harmful to the environment if not properly disposed of.

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