

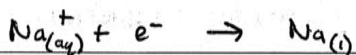
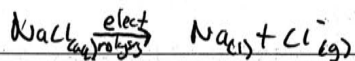
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a. ~~cell~~ ~~group~~ is an electrolysis cell, process depicted is the process of creating brine ~~(NaCl)~~

Molten brine (NaCl) is passed through an electrolysis cell to decompose into ~~Na~~ Na^+ & Cl^- , chlorine easily filtered as it enters gaseous form at very high temperatures. then sodium ~~is~~ is then mixed with water and with a lack of pressure easily forms NaOH most probably separated through a filter

b. Molten sodium chloride when undergoes in electrolysis & decomposes into its base elements of sodium & chlorine, aqueous sodium chloride however produces hydrochloric acid.

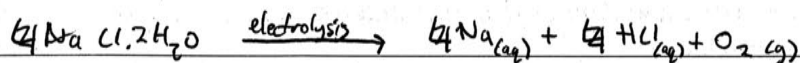
molten NaCl is pure NaCl hence why in electrolysis forms Na^+ & Cl^- , ~~NaCl~~ ~~is~~ ~~not~~ ~~the~~ ~~same~~



with the addition of H_2O

in an aqueous solution of NaCl

electrolysis doesn't target sodium & chlorine ~~as~~ rather sodium & oxygen



the sodium is thus harder to extract as it's suspended in hydrochloric acid. hence the electrolysis of molten NaCl

is more efficient. however requires alot more energy, each

setup requires its own equipment as to handle the reactants & products,

however the electrolysis of molten NaCl is more cost effective in industry.

$$c.(1) \quad SO_3 = 32.16 + 32.07$$

$$= 80.07 \text{ g/mol.}$$

$$SO_2 = 22.16 + 32.07$$

$$= 64.07 \text{ g/mol}$$

$$0.6 \times 64.07 = 38.442 \quad (SO_2 \text{ at time A})$$

$$0.4 \times 80.07 = 32.028 \quad (SO_3 \text{ at time A}).$$

$$K \text{ at time A} = [SO_2][SO_3]$$

$$= [38.442][32.028]$$

$$= 1231.220376.$$

(ii) at time B SO_2 & SO_3 have already undergone an equilibrium reaction. due to the conditions provided by a sealed container the equilibrium reaction between SO_2 & SO_3 is reversed as can be seen in the diagram graph. hence because the equilibrium has changed so must its position have shifted at time B.

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d. (i) reaction presented in d is a saponification reaction. hence reactant **A** must be the compound OH^- (hydroxide) as its a vital component in the making of soaps)

(ii) no specific equipment needed apart from beakers & measuring devices, all that is needed is to mix the reactants.

suitable eyewear and gloves must be worn to prevent damage in case of OH^- spillage as OH^- is highly corrosive if not dilute, standard lab coats and hard leather shoes are also a must & long hair must be tied back (all standard laboratory procedures) in case of spillage it is highly recommended to have an amphiprotic substance at bay to quickly neutralise.

e. limestone is an important substance in the creation of sodium hydrogen carbonate & sodium carbonate. ~~it is~~ its the cheapest substance that when combusted produces carbonate. and in the overall reaction using limestone is less harmful to the environment than its corresponding source of carbonate. whilst it doesn't directly produce CO_2 when combusted simple reactions with CO_2 & O_2 form CO_2 , the calcium oxide product also produced from its combustion is also key to another reaction involved in the Solvay process.

By replacing limestone with an alternative could greatly increase costs in the production of sodium carbonate as alternative sources of calcium oxide would also need to be used and overall increasing the hassle in creating the desired compound. The calcium in one of the final products of the Solvay process however poses a threat to the environment. It cannot go back to its source or disposed of on land because the concentration of calcium of its total output is too high. However this can be simply diluted and pumped out to a very large volume of water such as the sea, the calcium originally from the limestone poses no threat to marine environments. The use of limestone in the Solvay process proves to be vital & far more economically viable and safer to the environment than the use of other carbonate sources. It is obvious that limestone is very important in the Solvay process.

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