Sodium: Questions

1. (a) Finish the ionic equations for the reactions taking place at each electrode in the electrolysis of molten sodium chloride.

   Negative electrode (cathode) $Na^+ +$ ___ $\rightarrow$ ___

   Positive electrode (anode)   ___$Cl^- \rightarrow$ ___ $+$ ___   [3]

   (b) A factory has 100 cells producing sodium. The current in each cell is 40,000 A.

   (i) Calculate the quantity of electricity, in faradays, used for all the cells in the factory over a 24 hour period of continuous working. (1 faraday = 96,000 C)

   _____ _____faradays [2]

   (ii) Calculate the mass of sodium produced in the factory in this period. (Relative atomic mass: Na = 23, 1 tonne = 1,000 kg)

   _____ _____tonnes [3]

2. Sodium chloride, used in the cells, contains 0.05% water. This water would react with sodium produced in the process to form hydrogen.

   $$2Na + 2H_2O \rightarrow 2NaOH + H_2$$
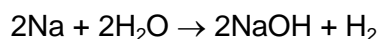
   (a) Calculate the mass of water in 100 tonnes of salt.

   _____ _____tonnes [1]

(b)   What mass of hydrogen would be produced if this water reacted with sodium? (Relative atomic masses: H = 1, O = 16)

_____ _____kg [3]

(c)   Calculate the volume of hydrogen produced, at room temperature and pressure, if this water reacted with sodium. (One mole (the formula mass) of any gas at room temperature and pressure has a volume of 24 dm^3)

_____ _____dm^3 [2]