Task

We mix 50ml of alu water hydrochloric acid with 100ml of 0.5 M sodium hydroxide 50 ml.
a) is this mixture acidic or basic?
b) find the concentration of the base.
c) name the salt obtained.
d) a compound form the elements (C,H,O) has a molar mass M= 46 g/mole, the percent mass composition is
C=52.7%
H=13.05%
O=43.78%

Data:

V_1 (H_2O) = 50 ml
V_2 (HCl) = 100 ml
V_3(NaOH) = 50 ml
C_M (NaOH) = 0.5 M

C (NaOH) = ?
Salt - ?
Type of mixture - ?

After mixing water (100 ml) and hydrochloric acid (50 ml) we got a water solution of the acid. This solution we mix with sodium hydroxide.
In order to know what salt we can obtain we need to calculate quantity of acid and base which is going to react:

$$\upsilon \ (HCl) = \frac{V}{V_m} = \frac{0,1\ l}{22,4\ l/mol} = 0,00446\ mol$$

Concentration is counted according to formula:

$$C = \frac{\upsilon}{V};$$

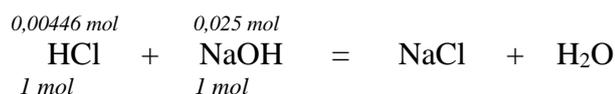So we can find quantity of sodium hydroxide:
υ (NaOH) = C·V = 0,5M·0,05 l = 0,025 mol
According to these calculation the amount of base is much higher than acid, that's why after reaction we receive **neutral salt. The mixture is basic (a).**
The process is represented through the chemical reaction:

$$\underset{1\ mol}{\overset{0,00446\ mol}{HCl}} + \underset{1\ mol}{\overset{0,025\ mol}{NaOH}} = NaCl + H_2O$$

Obtained salt is sodium chloride (NaCl) (c).
According to the chemical reaction only 0,00446 mol of NaOH reacted, thus the residue NaOH is following:
υ (NaOH) = 0,025 mol – 0,00446 mol = 0,02054 mol
b) Concentration of base:
C (NaOH) = $\frac{\upsilon}{V}$
V = V_1+V_2+V_3 = 0,05 l +0,1 l +0,05 l = 0,2 l
$$C\ (NaOH) = \frac{0,02054\ mol}{0,2\ l} = 0,1027\ mol/l.$$

a) Mixture is basic;

b) Concentration of base - *0,1027 mol/l*;

c) Obtained salt is sodium chloride (NaCl).

d)

Data:

M $(C_xH_yO_z)$ = 46 g/mol
W (C) = 52,7 %
W (H) = 13,05%
W(O) = 43,78%
_____
$(C_xH_yO_z)$ - ?

$$W (E) = \frac{n \cdot Ar\ (E)}{M\ (CxHyOz)} \cdot 100\%$$

$$n(E) = \frac{W\ (E) \cdot M(CxHyOz)}{100\% \cdot Ar\ (E)}$$

$$n\ (C) = \frac{52,7\% \cdot 46\ g/mol}{100\% \cdot 12\ g/mol} = 2;$$

$$n\ (H) = \frac{13,05\% \cdot 46\ g/mol}{100\% \cdot 1 g/mol} = 6;$$

$$n\ (O) = \frac{43,78\% \cdot 46\ g/mol}{100\% \cdot 16 g/mol} = 1.$$

Formula is **C₂H₅OH**

The compound is **ethanol.**