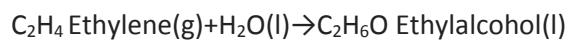


Answer on Question #54712 – Chemistry – General chemistry

Question:

Ethyl alcohol is prepared industrially by the reaction of ethylene, C_2H_4 , with water.

What is the percent yield of the reaction if 4.8 g of ethylene gives 4.7 g of ethyl alcohol?



Express your answer using two significant figures.

Answer:

The number of moles of ethylene is:

$$v(C_2H_4) = m(C_2H_4)/M(C_2H_4) = 4.8 \text{ g}/[(2 \times 12 + 4) \text{ g mol}^{-1}] = 0.1714 \text{ mol}$$

The number of moles of ethyl alcohol is:

$$v(C_2H_5OH) = m(C_2H_5OH)/M(C_2H_5OH) = 4.7 \text{ g}/[46 \text{ g/mol}^{-1}] = 0.1022 \text{ mol}$$

If the yield of reaction is 100%, all ethylene is transformed into ethyl alcohol giving 0.1714 moles of the product.

Therefore, the yield of the reaction equals:

$$Y = [v(C_2H_5OH)/v(C_2H_5OH)_{\text{teor}}] \times 100\%,$$

where $v(C_2H_5OH)_{\text{teor}}$ – the number of moles of ethanol upon 100% conversion of ethylene.

$$\text{Thus, } Y = [0.1022 \text{ mol}/0.1714 \text{ mol}] \times 100\% = 59.61 \%$$