



Reaction Pathways

Ethanol is made through the process of **fermentation with yeast**. The reaction rate is relatively low and has a percentage yield of 15% and an atom economy of 51%.

glucose \longrightarrow ethanol + carbon dioxide



Ethanol can also be made through the **hydration of ethene** using **steam**. The reaction rate is high with a percentage yield of 95% and an atom economy of 100%.

ethene + water \rightleftharpoons ethanol



Using the information, evaluate the two processes of making ethanol. You will need to comment on the reaction rate, yield, equilibrium position and usefulness of any waste products.
