

1. Being that the reaction takes place in an aqueous solution, the vanillin is first deprotonated by sodium hydroxide (NaOH), to form a water-soluble salt.
2. The carbonyl group, being polar, results in the slightly positive carbon atom to act as the electrophile for the nucleophilic hydride (from NaBH₄) to attack.
3. The new oxygen anion reacts with the Lewis acid, BH₃, to form an oxygen-boron bond, consequently regenerating the negatively charged boron atom. The borane is, as a result, recycled and continues to donate hydride equivalents until (potentially) all four hydride nucleophiles have reacted.
4. The oxygen-boron bonds are then hydrolyzed with the addition of 3M of hydrochloric acid. In addition to this, HCl also destroys excess NaBH₄, neutralizes excess NaOH, and protonates the phenolic oxygen. The protonation of the phenolic oxygen results in the precipitation of vanillyl alcohol from the solution, which can be collected through vacuum filtration.