Spivey Group Problem Session – Total Synthesis of (-)-Silvestrol and (-)-Episilvestrol

The roaglate derivatives Silvestrol and Episilvestrol, isolated from the fruits and twigs of the woody plant species *Aglaia*, has been found to show very potent in vitro cytotoxic activity against several human cancer cell lines comparable to that of the well-known anticancer drug paclitaxel (Taxol®).

Below is a portion of the total synthesis of (-)-Silvestrol and (-)-Episilvestrol. Please provide reagents, conditions and intermediates where indicated as well as mechanisms for all steps.

**Synthesis of the 1,4-Dioxane fragment**
What is the name of the reaction that couples these two portions together (DiAD, Ph₃P, 0°C, 2 h)?
Give a reason for the stereochemistry achieved.