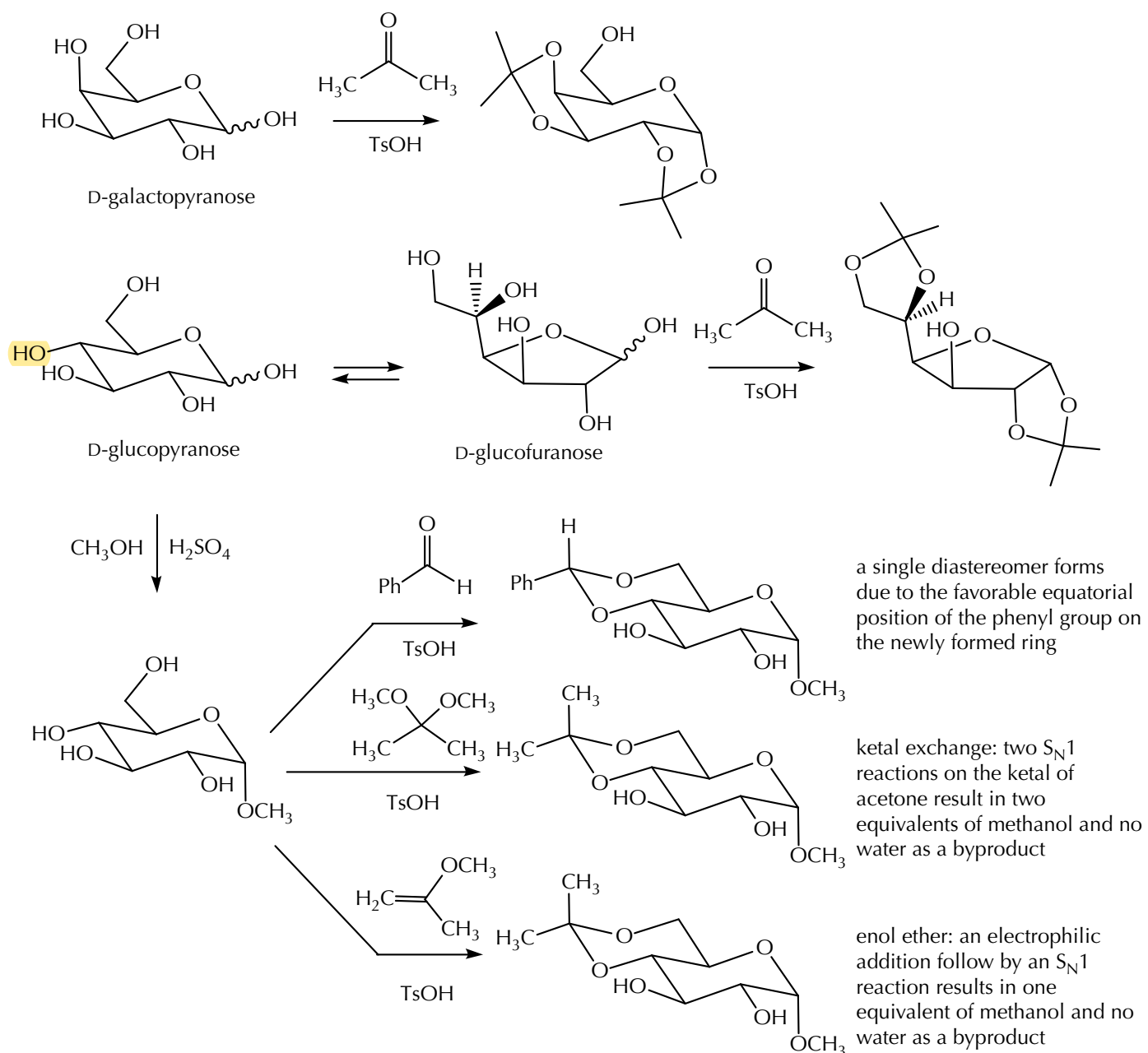


1720 CHAPTER 16 The Chemistry of Carbohydrates

There are many pairs of hydroxyl groups that might form acetals and ketals with added carbonyl compounds, and these reactions are observed (Figure 1638).

Figure 1638

Acetals and ketals observed in the reactions of D-glucose and D-galactose.



With so many different pairings possible, and glucose itself being an equilibrium mixture of open chain, pyranose and furanose forms, predicting the outcome from trying to form acetals is difficult to impossible. Once known, however, chemists can certainly make use of the experimentally observed results. When the ketals from acetone are made from glucose itself, the equilibrium favors the capture of the low percentage of the furanose form with two equivalents of acetone. Even changing one stereocenter (e.g., galactose is the C-4 epimer of glucose) gives a different result. And if the methyl glycoside is formed first, then only one equivalent of a ketone or aldehyde is captured. Two other methods are shown for making ketals, starting from the methyl glycoside example: (1) ketal exchange, where the ketal of acetone is used instead of