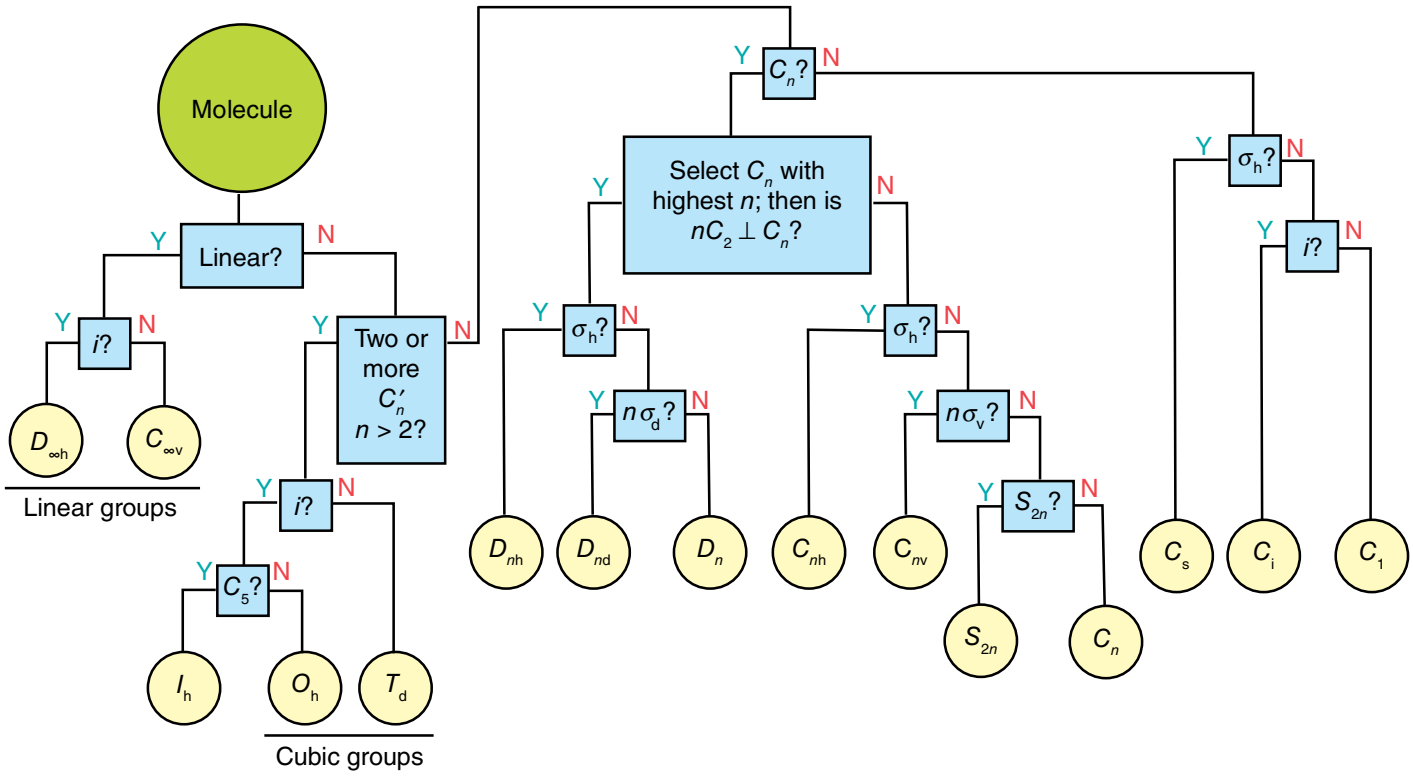
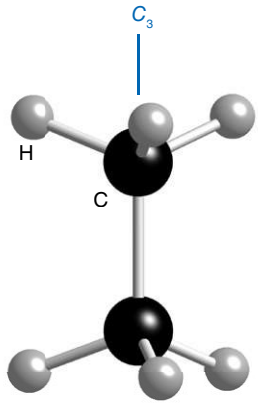
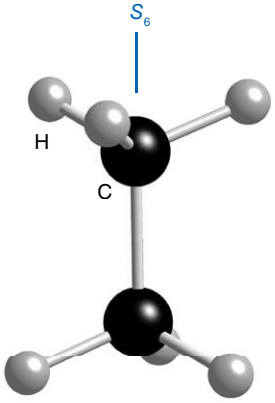


FIGURE 3.9 The decision tree for identifying a molecular point group. The symbols of each point refer to the symmetry elements.



2 A C_3 axis



3 An S_6 axis

EXAMPLE 3.2 **Identifying the point group of a molecule**

To what point groups do H_2O and XeF_4 belong?

Answer We need to either work through Table 3.2 or use Fig. 3.9. (a) The symmetry elements of H_2O are shown in Fig. 3.10. H_2O possesses the identity (E), a two-fold rotation axis (C_2), and two vertical mirror planes (σ_v and σ_v'). The set of elements (E, C_2, σ_v, σ_v') corresponds to those of the group C_{2v} listed in Table 3.2. Alternatively we can work through Fig. 3.9: the molecule is not linear; does not possess two or more C_n with $n > 2$; does possess a C_n (a C_2 axis); does not have $2C_2 \perp$ to the C_2; does not have σ_h; does not have $2\sigma_v$; it is therefore C_{2v}.

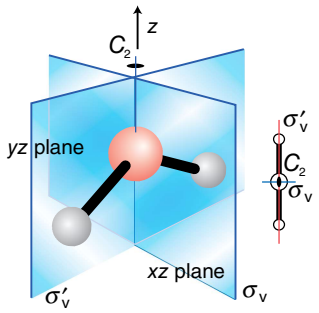


FIGURE 3.10 The symmetry elements of H_2O. The diagram on the right is the view from above and summarizes the diagram on the left.