Warfarin, whose structure is shown below, is a synthetic anticoagulant.

Give the molecular formula of warfarin.  \( \text{C}_{19}\text{H}_{16}\text{O}_{4} \)

What is the configuration at the stereogenic (chiral) carbon centre of warfarin?

(S) 
(1 \( \rightarrow \) 2 \( \rightarrow \) 3 is anticlockwise)

Draw the structures of two tautomers of warfarin.
The structure of testosterone, an important male hormone, is shown below.

Give the molecular formula of testosterone.

\[ \text{C}_{19}\text{H}_{28}\text{O}_2 \]

Identify the functional groups present in testosterone.

* conjugated ketone, alkene, alcohol (secondary)

How many stereogenic (chiral) centres are there in testosterone?

6 (marked above)

Draw the constitutional formula of the product formed when testosterone is treated with the following reagents.

- Excess methanol / HCl
- LiAlH\(_4\) in dry ether; then H\(^\ominus\) / H\(_2\)O
- Concentrated H\(_2\)SO\(_4\) / heat
- H\(_2\) / Pd catalyst