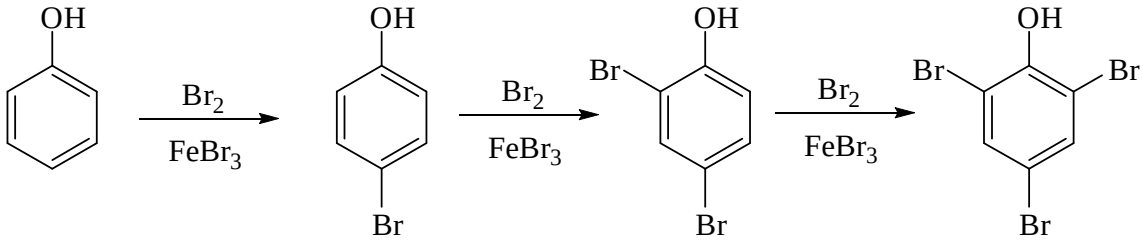
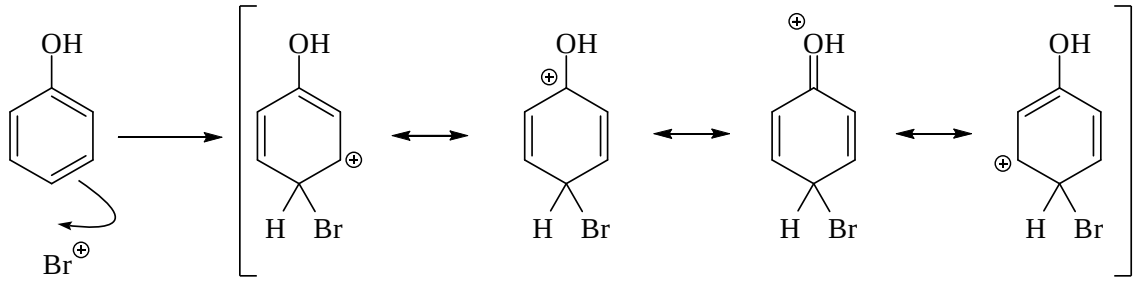
Marks 3

- The bromination of phenol proceeds as follows.



Show the Wheland intermediate for one of these steps and explain why bromination occurs at positions 2, 4 and 6, but not at positions 3 and 5.

Bromination at the 4 (or 2 or 6) position gives a Wheland intermediate that has four resonance contributors as the lone pair on the oxygen can be donated into the ring to help stabilise the charge.



Bromination at the 3 or 5 position gives a Wheland intermediate that has only three resonance contributors - the lone pair on the oxygen cannot participate in the resonance stabilisation.