

## Chemguide – answers

### PHENYLAMINE: REACTION WITH BROMINE WATER

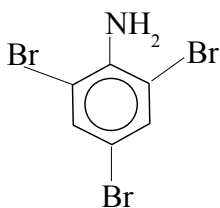
1. a) An activating group makes the ring more reactive than it is in benzene itself. The lone pair on the nitrogen atom in the  $\text{NH}_2$  group overlaps with the delocalised benzene ring electrons and itself becomes delocalised. That extra movement of electrons towards the ring increases the electron density on the ring.

The ring is attacked by things carrying a full or partial positive charge. Increasing the electron density around the ring makes it even more attractive to such things.

b) This means that incoming groups will substitute into the 2- or 4- positions relative the  $\text{NH}_2$  group, where the ring carbon with the  $\text{NH}_2$  attached counts as the number 1 position. That means that the incoming groups attach next door to the  $\text{NH}_2$  group or opposite it.

2. a) The bromine water is decolourised, and a white precipitate is formed.

b)



2,4,6-tribromophenylamine

c) Phenylamine is slightly basic and so will dissolve freely in acids such as dilute hydrochloric acid, but not in alkalis. Phenol is slightly acidic and so will dissolve in alkalis such as sodium hydroxide solution, but not in acids.

d) With an alkene, the bromine water is decolourised, but no precipitate is formed.