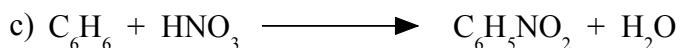


Chemguide – answers

PHENYLAMINE: PREPARATION

1. a) React with concentrated nitric acid and concentrated sulphuric acid at a temperature not exceeding 50°C for about half-an-hour.

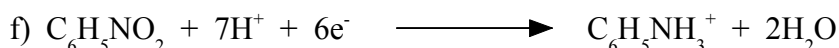
b) At a higher temperature you can get more than one NO₂ group substituted into the ring.



(You can draw the benzene rings if you want to. For an equation like this, it doesn't really matter which form you use.)

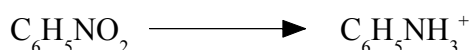
d) In the first step, you heat the nitrobenzene under reflux with tin and concentrated hydrochloric acid for about half-an-hour. In the second step, you add sodium hydroxide solution to the reaction mixture.

e) The reduction of the nitrobenzene takes place under strongly acidic conditions, and so you get the salt of phenylamine formed instead of free phenylamine. The sodium hydroxide solution releases the free amine from the salt.



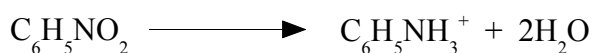
Problems working this out? Do NOT try to learn it – you need to be able to work out equations like this wherever they come up.

Start with what you know:

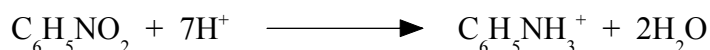


All you can add to this for a reaction under acidic conditions is water, hydrogen ions and electrons.

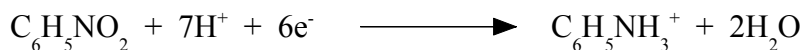
The oxygen on the left-hand side must end up as water:



The extra hydrogens on the right-hand side must come from hydrogen ions:



Finally balance the charges by adding electrons:



(I know I said on the Chemguide page that you probably won't need to have to do this in this context, but it is something you will have to do elsewhere in your course. The more you practise the better!)

