PHENYLAMINE: REACTIONS OF DIAZONIUM SALTS

1. Diazonium ions undergo two different sorts of reactions. This question is about their substitution reactions in which the N_2^+ group is replaced by something else.

   a) How would you replace the N_2^+ group by an OH group?

   b) Write the ionic equation for the reaction you have described.

   c) How would you replace the N_2^+ group by an iodine atom?

   d) Write the ionic equation for the reaction you have described.

2. This question is about the coupling reactions of diazonium compounds.

   a) Benzene diazonium chloride solution reacts with an ice-cold solution of sodium phenoxide, $C_6H_5O^-$ Na^+, to give a yellow-orange precipitate or solution.

   (i) How do you make a solution of sodium phenoxide starting from phenol?

   (ii) Write the equation for the reaction between phenoxide ions and diazonium ions to produce the coloured product. Show clearly the structures of all the substances involved.

   b) Naphthalen-2-ol (2-naphthol, beta-naphthol) has a similar reaction with diazonium ions, which is carried out in a similar way. The naphthalen-2-ol is first converted into its negative ion, and then reacted with benzenediazonium chloride - everything being ice-cold. An intense orange precipitate is formed.

   (i) Draw the structure for naphthalen-2-ol.

   (ii) Draw the structure for the negative ion formed from it.

   (iii) Write the equation for the reaction of that ion with benzenediazonium ions, showing clearly the structure of the product.

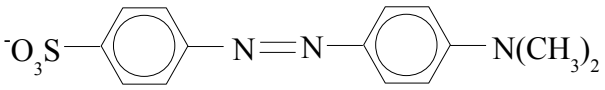
   c) The dye "aniline yellow" is made by reacting benzenediazonium chloride solution with phenylamine (aniline). Draw its structure.

continued . . .

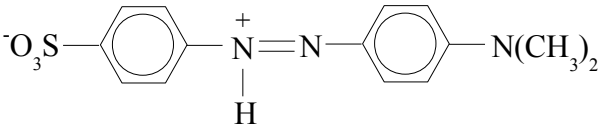
3. a) Explain briefly why azo compounds (compounds like the ones you will have drawn in Q2 containing a -N=N- bridge between two benzene rings) are coloured.

   b) Methyl orange is an azo compound and comes in two forms:

A



B



One form is red and the other yellow. Which is which? Explain your reasoning.