

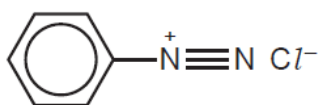
A level Chemistry B

H433/03 Practical skills in chemistry

Question Set 5

- 1 (a) A student decides to use a microscale method to synthesise an azo dye and dye a fabric.

The student initially makes a small amount of a solution of the diazonium compound shown below, starting from an aromatic amine.



diazonium compound

Name the reagents and conditions needed to make this compound.

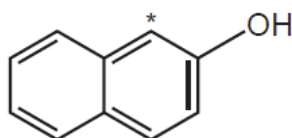
Reagents.....

Conditions.....

[3]

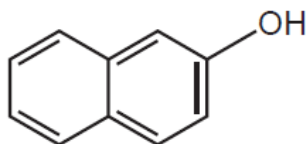
- 1 (b) (i) Naphthalen-2-ol, shown below, is used to make the dye. A piece of cotton is dipped into naphthalen-2-ol dissolved in sodium hydroxide. The diazonium solution is then added to dye the cotton red.

The coupling reaction involves the carbon atom marked with an asterisk, *.



naphthalen-2-ol

Complete the structure of the azo dye formed in this coupling reaction.



[1]

- 1 (ii) The azo dye formed above has an extended delocalised system.

Describe the bonding occurring in a delocalised system and explain why this can lead to organic compounds being coloured.

[4]

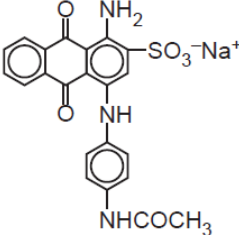
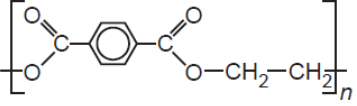
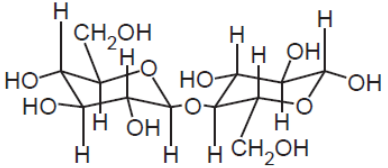
- 1 (c) (i) Other functional groups can be attached to dye molecules and these can modify the properties of the dye.

Give **one** property of the dye that might be affected if nitro, NO_2 , groups are attached [1]

- 1 (ii) Give a **different** property affected by the attachment of sulfonate, SO_3^- , groups. [1]

- 1 (d) Attractions between dye molecules and polymer molecules in fabric fibres can be ionic, covalent or intermolecular bonds.

Use your knowledge of molecular interactions to fill in the empty boxes in the following table.

Type of fabric	Structure/features of polymer molecule	Structure/features of dye molecule	Strongest type of attraction between polymer and dye
Wool	A protein chain with $-\text{NH}_3^+$ groups at the end of side chains when dyed in acid solution		
		Few polar groups on dye molecule	
Cotton		Several $-\text{NH}_2$ groups. Linear molecule	

[2]

Total Marks for Question Set 5 = 12

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