

Organic Nitrogen Compounds - Questions by Topic

Q1.

Identify the correct trend of **increasing** strength as a base.

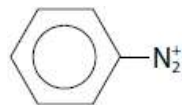
(1)

- A** $\text{C}_6\text{H}_5\text{-NH}_2 < \text{H-NH}_2 < \text{CH}_3\text{-NH}_2$
- B** $\text{C}_6\text{H}_5\text{-NH}_2 < \text{CH}_3\text{-NH}_2 < \text{H-NH}_2$
- C** $\text{H-NH}_2 < \text{CH}_3\text{-NH}_2 < \text{C}_6\text{H}_5\text{-NH}_2$
- D** $\text{H-NH}_2 < \text{C}_6\text{H}_5\text{-NH}_2 < \text{CH}_3\text{-NH}_2$

(Total for question = 1 mark)

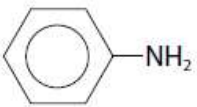
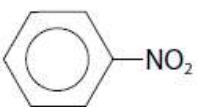
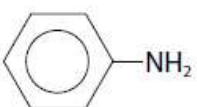
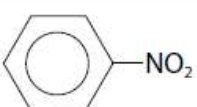
Q2.

Azo dyes are made from the benzenediazonium ion.



(a) Benzenediazonium ions can be made from:

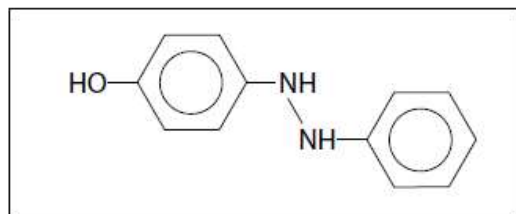
(1)

	Reagent 1	Reagent 2
<input type="checkbox"/> A	HNO_2	
<input type="checkbox"/> B	HNO_2	
<input type="checkbox"/> C	HNO_3	
<input type="checkbox"/> D	HNO_3	

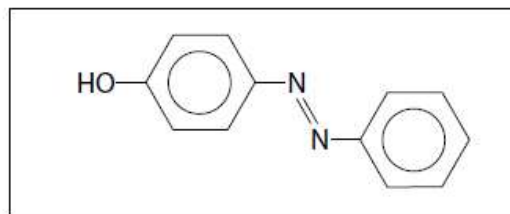
(b) The structure of the azo dye formed when benzenediazonium ions react with phenol is

(1)

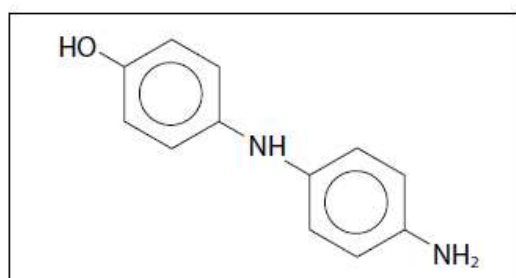
A



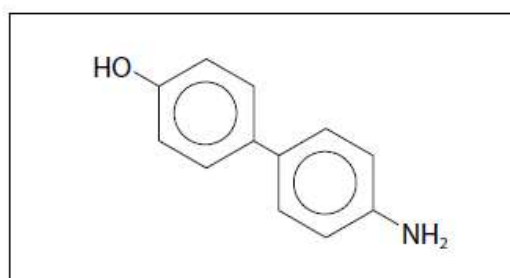
B



C



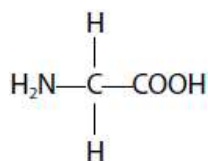
D



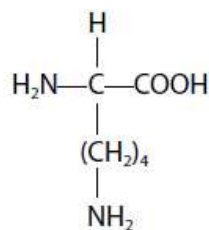
(Total for question = 2 marks)

Q3.

Glycine and lysine are two naturally-occurring amino acids.



glycine



lysine

(a) Write the equation for the reaction of glycine with sodium hydroxide.

State symbols are not required.

(1)

(b) Calculate the volume, in cm^3 , of $0.100 \text{ mol dm}^{-3}$ hydrochloric acid required to completely react with 1.825 g of lysine.

[M_r of lysine = 146]

(2)

(c) Lysine exists as optically active enantiomers but glycine does not.

(i) Draw three-dimensional diagrams of the two optically active lysine enantiomers.

(2)

(ii) Describe how these optically active enantiomers could be distinguished.

Practical details are not required.

(2)

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(iii) State why glycine does not exist as enantiomers.

(1)

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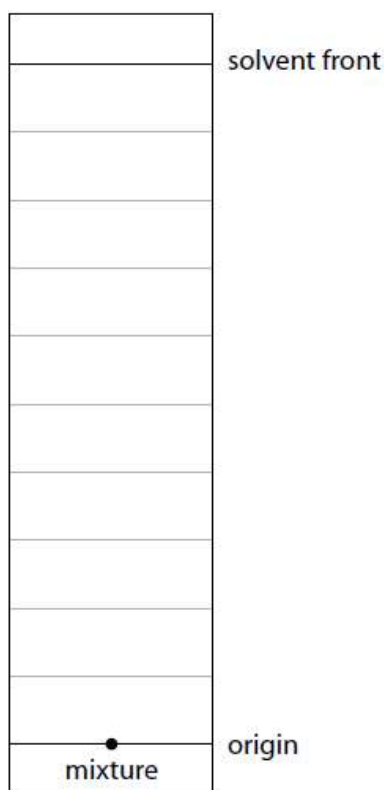
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(d) Chromatography can be used to separate a mixture of glycine and lysine.

Draw spots to show the location of glycine and lysine on the chromatogram, given that their R_f values are 0.26 and 0.14 respectively.

(1)



(e) Naturally-occurring glycine and lysine can join together to form different dipeptides.

Draw a different dipeptide of glycine and lysine.

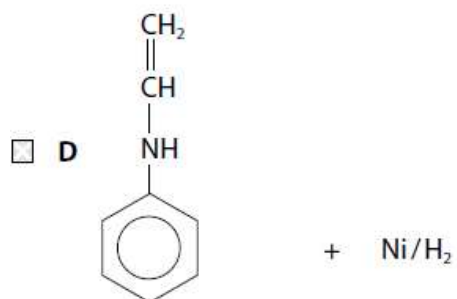
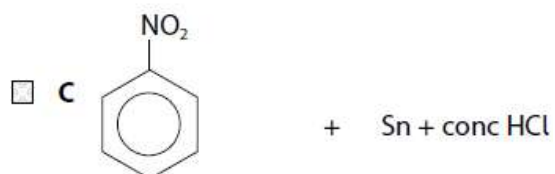
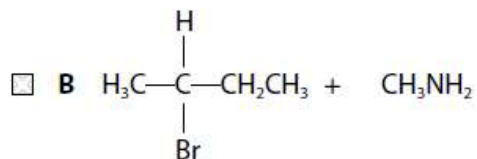
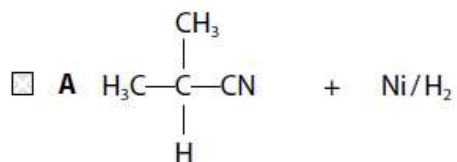
(1)

Dipeptide 1	Dipeptide 2
$ \begin{array}{ccccccc} & \text{H} & \text{O} & & \text{H} & & \\ & & & & & & \\ \text{H}_2\text{N} & -\text{C} & -\text{C} & -\text{N} & -\text{C} & -\text{COOH} \\ & & & & & & \\ & \text{H} & & \text{H} & (\text{CH}_2)_4 & & \\ & & & & & & \\ & & & & \text{NH}_2 & & \end{array} $	

(Total for question = 10 marks)

Q4.

Which combination of reactants will produce a primary aliphatic amine as the product?



(Total for question = 1 mark)

Q5.

Which equation shows the two compounds that react to produce ethanamide, CH_3CONH_2 , in a single step?

(1)

- A** $\text{CH}_4 + \text{HCONH}_2 \rightarrow \text{CH}_3\text{CONH}_2 + \text{H}_2$
- B** $\text{CH}_3\text{COOH} + \text{NH}_3 \rightarrow \text{CH}_3\text{CONH}_2 + \text{H}_2\text{O}$
- C** $\text{CH}_3\text{COCl} + \text{NH}_3 \rightarrow \text{CH}_3\text{CONH}_2 + \text{HCl}$
- D** $\text{CH}_3\text{CHO} + \text{NH}_3 \rightarrow \text{CH}_3\text{CONH}_2 + \text{H}_2$

(Total for question = 1 mark)