

# Nitrogen Compounds

## Question Paper 8

<b>Level</b>	International A Level
<b>Subject</b>	Chemistry
<b>Exam Board</b>	CIE
<b>Topic</b>	Nitrogen Compounds
<b>Sub-Topic</b>	
<b>Paper Type</b>	Theory
<b>Booklet</b>	Question Paper 8

**Time Allowed:** 40 minutes

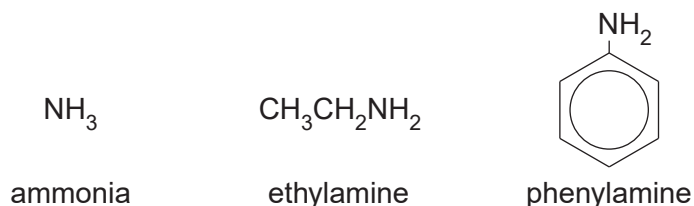
**Score:** /33

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 (a) Describe and explain how the basicities of ammonia, ethylamine and phenylamine differ.



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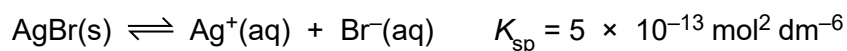
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- (b) Describe how the use of aqueous silver nitrate and aqueous ammonia can distinguish between aqueous solutions containing chloride, bromide or iodide ions by filling in the following table.

halide	observation when $\text{AgNO}_3(\text{aq})$ is added	observation when dilute $\text{NH}_3(\text{aq})$ is added	observation when concentrated $\text{NH}_3(\text{aq})$ is added
chloride			
bromide			
iodide			

[3]

- (c) Silver bromide is sparingly soluble in water.



- (i) Calculate  $[\text{Ag}^+(\text{aq})]$  in a saturated aqueous solution of AgBr.

$$[\text{Ag}^+(\text{aq})] = \dots\dots\dots \text{ mol dm}^{-3}$$

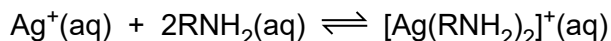
- (ii) State and explain whether AgBr will be less or more soluble in  $0.1 \text{ mol dm}^{-3}$  KBr than it is in pure water.

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[2]

(d) Silver ions form complexes with ammonia and with amines.



(i) Write an expression for the  $K_c$  for this reaction, and state its units.

$K_c =$  ..... units .....

$K_c$  has the numerical value of  $1.7 \times 10^7$  when  $R = \text{H}$ .

(ii) Using your expression for  $K_c$  calculate the  $[\text{NH}_3(\text{aq})]$  needed to change the  $[\text{Ag}^+(\text{aq})]$  in a  $0.10 \text{ mol dm}^{-3}$  solution of silver nitrate to the value that you calculated in (c)(i).

$[\text{NH}_3(\text{aq})] =$  .....  $\text{mol dm}^{-3}$

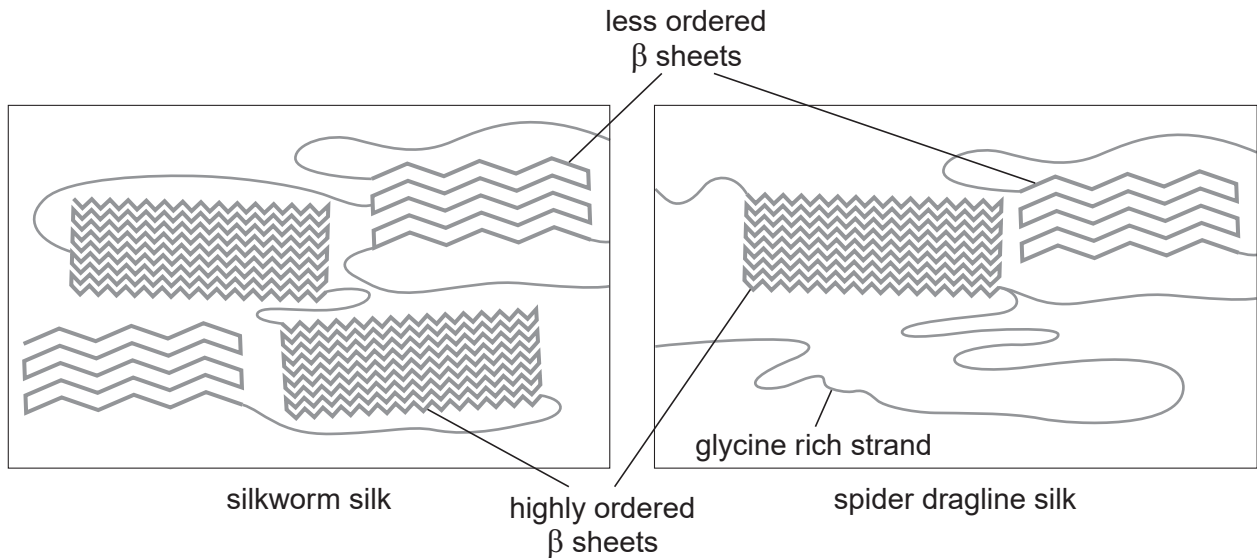
(iii) Explain whether you would expect the  $K_c$  for the reaction where  $R = \text{C}_2\text{H}_5$  to be greater or less than that for the reaction where  $R = \text{H}$ .

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[5]

[Total: 13]

- 2 (a) Silk from silkworms, used as a fabric shows a different secondary structure to that produced by spiders.



- (i) What sort of bonding would you expect to occur between adjacent parts of the protein chains in each form of silk?

silkworm .....

spider .....

- (ii) Suggest **two** differences in properties that these forms of silk could have. Explain your answer.

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- (iii) Spider dragline silk contains large amounts of the amino acid glycine. How does this affect the properties of the silk?

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**(b)** Both forms of silk are condensation polymers.

**(i)** Explain what is meant by a condensation polymer.

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**(ii)** Another type of polymer is called an addition polymer. Name an example of an addition polymer.

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**(iii)** Suggest why condensation polymers such as proteins show a wider range of properties than addition polymers.

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[5]

[Total: 10]

3. The technique of DNA fingerprinting has been one of the most important developments in biochemical analysis in recent times. It has enabled enormous advances to be made in forensic science, medicine and archaeology.

(a) The table shows different stages in the production of a genetic fingerprint. Use the numbers 1 to 6 to put the stages in the correct sequence in the blank column.

stages	process	correct sequence (numbers)
A	place samples on agarose gel	
B	use polymerase chain reaction	
C	label with radioactive isotope	
D	extract DNA	
E	use restriction enzyme	
F	carry out electrophoresis	

[3]

(b) One of the stages above uses a radioactive isotope.

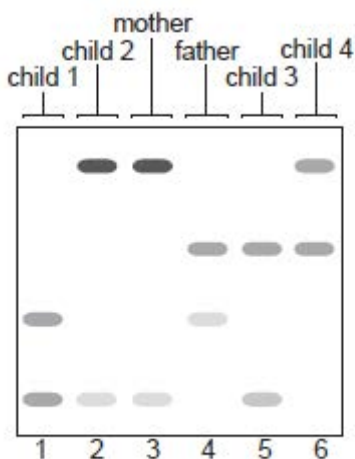
(i) What isotope is used? .....

(ii) Why is this isotope chosen?

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[2]

(c) The following DNA fingerprints were taken from a family of mother, father and four children.



(i) Are all of the children related to the mother? State the evidence for your answer.

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(ii) Which child is unlikely to be related to the father? State the evidence for your answer.

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[2]

(d) DNA fingerprinting has been successfully used in archaeological investigations.

(i) Ancient writings were often made on goatskins. Over the centuries these have often become broken into fragments, making reconstruction of the writings almost impossible.

Suggest how the use of DNA fingerprinting might be able to identify which fragments came from a particular skin.

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(ii) Apart from the examples of human remains and goatskins, state one other material that could be investigated using this technique.

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[3]

[Total: 10]