CHEMISTRY ONLINE
TUITION

Phone: +442081445350

www.chemistryonlinetuition.com

Email:asherrana@chemistryonlinetuition.com

CHEMISTRY

INORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	AMINES
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	10
TOTAL MARKS	57

Amines - 1

1. This question is about amines.

(a) Give an equation for the preparation of 1,6-diaminohexane by the reaction of 1,6-dibromohexane with an excess of ammonia.

(2)

(b) Write the mechanism for the reaction of ammonia with 6-bromohexylamine to form 1,6-diaminohexane.

Suggest the structure of a cyclic secondary amine that can be formed as a by-product in this reaction.

(4)

2. This question is about the primary amine $CH_3CH_2CH_2NH_2$

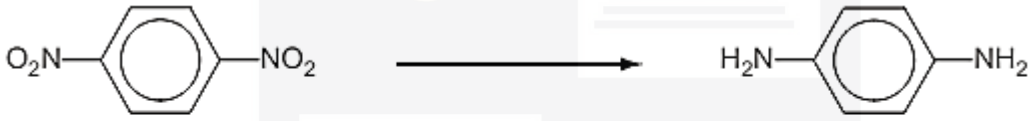
The amine $CH_3CH_2CH_2NH_2$ reacts with CH_3COCl

Name and outline a mechanism for this reaction.

Give the IUPAC name of the organic product.

(6)

3. 1,4-diaminobenzene can be manufactured from 1,4-dinitrobenzene.



1,4-dinitrobenzene 1,4-diaminobenzene

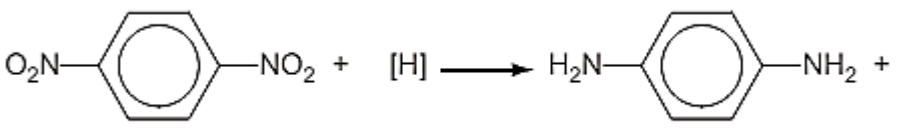
(a) What type of reaction is this?

(1)

(b) State reagents and conditions that could be used to carry out this reaction.

(2)

(c) Complete and balance the equation below for this reaction.



(2)

4. 1,4-Diaminobenzene is used to make permanent black dye for hair. 1,4-Diaminobenzene can irritate the skin because it is basic.

Therefore, it is sometimes neutralised with excess hydrochloric acid to give the salt.

(a) Explain how the amino groups in a primary amine such as 1,4-diaminobenzene allow the molecule to act as a base.

(2)

(b) Draw the structure of the salt formed in this reaction.

(2)

(c) State whether you would expect hexane-1,6-diamine to be a stronger or weaker base than 1,4-diaminobenzene.

hexane-1,6-diamine

Explain your reasoning.

(3)

5. Draw the structures of the two dipeptides which can form when one of the amino acids shown below reacts with the other.

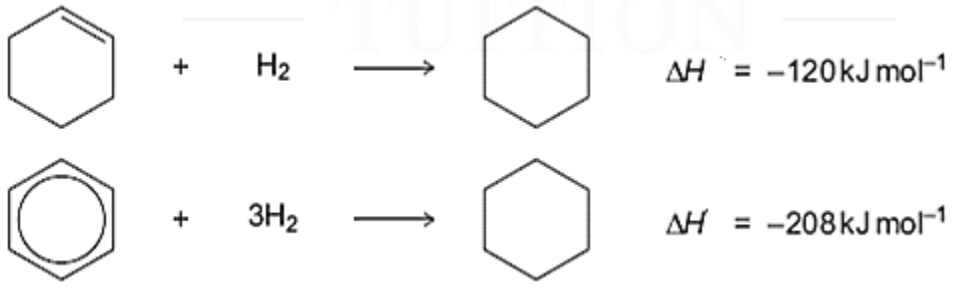
(2)

6. The hydrocarbons benzene and cyclohexene are both unsaturated compounds.

Benzene normally undergoes substitution reactions, but cyclohexene normally undergoes addition reactions.

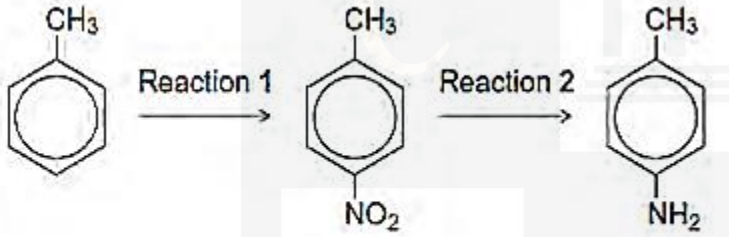
The molecule cyclohexatriene does not exist and is described as hypothetical.

Use the following data to state and explain the stability of benzene compared with the hypothetical cyclohexatriene.



(5)

7. Consider the following reaction sequence starting from methylbenzene.



J

(a) Name the type of mechanism for reaction 1.

(1)

(b) Compound J is formed by reduction in reaction 2.

Give a reducing agent for this reaction.

Write an equation for this reaction. Use [H] to represent the reducing agent.

Give a use for J.

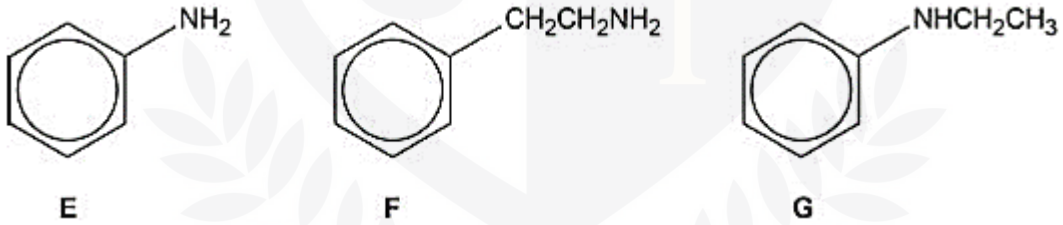
(3)

(c) Outline a mechanism for the reaction of bromomethane with an excess of compound J.

You should represent J as RNH_2 in the mechanism.

(4)

8. This question is about the three amines, E, F and G.



E F G

(a) Amines E, F and G are weak bases.

Explain the difference in base strength of the three amines and give the order of increasing base strength.

(6)

(b) Amine F can be prepared in a three-step synthesis starting from methylbenzene.

Suggest the structures of the two intermediate compounds.

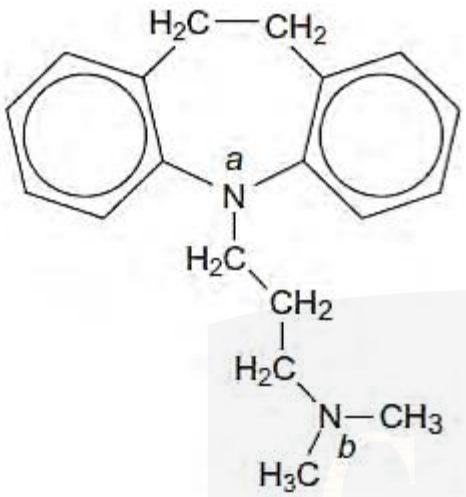
For each step, give reagents and conditions only.

Equations and mechanisms are not required.

(5)

9. Imipramine has been prescribed as an antidepressant.

The structure of imipramine is shown below.



(a) The medicine is usually supplied as a salt.

The salt is formed when one mole of imipramine reacts with one mole of hydrochloric acid.

Suggest why the nitrogen atom labelled b is more likely to be protonated than the nitrogen atom labelled a when the salt is formed.

(3)

(b) Deduce the molecular formula of imipramine and give the number of peaks in its ^{13}C n.m.r. spectrum.

(2)

10. A cation is formed when methylamine reacts with a large excess of bromoethane.

Name the mechanism involved in the reaction and draw the structure of the cation formed.

(2)

DR. ASHAR RANA

CHEMISTRY ONLINE TUITION

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, and Math's Tutor

CONTACT INFORMATION FOR **CHEMISTRY ONLINE TUITION**

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK