



CHEMISTRY ONLINE
— **TUITION** —

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CHEMISTRY

INORGANIC CHEMISTRY II

Level & Board	AQA (A-LEVEL)
TOPIC:	AMINES
PAPER TYPE:	SOLUTION - 4
TOTAL QUESTIONS	10
TOTAL MARKS	40

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Amines - 4

1.

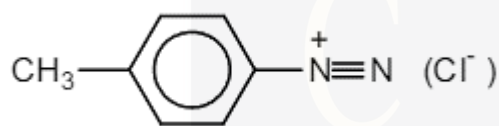
(a)

Nitrous acid / HNO_2 is the inorganic nitrogen-containing compound formed by the mixture of hydrochloric acid and sodium nitrite.

(1)

(b)

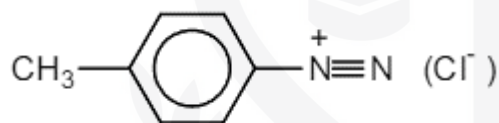
Following is an organic compound formed in the ice-cold acidic mixture.



(1)

(c)

Diazonium (ion / salt)



(1)

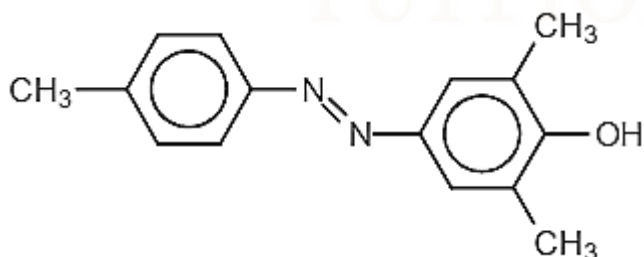
(d)

Maintaining a low temperature prevents the unstable diazonium ions from decomposing or reacting with other substances.

(1)

(e)

Structure of the dye:



(2)

2. C

(1)

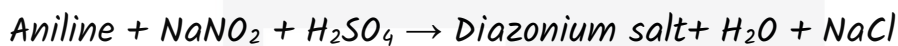
3. C

(1)

4.

1st stage:

- Aromatic amine: Aniline ($C_6H_5NH_2$)
- Sodium nitrite ($NaNO_2$)
- HCl/H_2SO_4 (diluted HCl or H_2SO_4)
- H^+ ions (From the acid)
- Temperature maintained at $<10^\circ C$

*2nd stage:*

- The product from the first stage mixed with phenol
- Excess phenol
- Hydroxide ions ($NaOH$)
- Correct formulae for the reagents: Aniline ($C_6H_5NH_2$), Sodium nitrite ($NaNO_2$), Phenol (C_6H_5OH), Sodium hydroxide ($NaOH$)



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(7)

5.

The term "diamino" refers to the presence of two amine groups ($-NH_2$) in the compound.

In 1,4-diaminobenzene, these two amine groups are positioned at the first and fourth carbon atoms of the benzene ring.



1,4-diaminobenzene

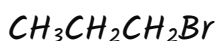
The "1,4" denotes the specific positions of these amine groups on the benzene ring, indicating that they are attached to the first and fourth carbon atoms, respectively.

So, diamino" refers to two amine groups, and "1,4" indicates their position on the benzene ring, specifically at the first and fourth carbons.

(2)

6.
(a)

The structure of the compound:



This is 1-bromopropane.

In a nucleophilic substitution reaction, the bromine atom (Br) could be replaced by a nucleophile, such as an amine (NH_2), resulting in the formation of propylamine ($\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$).

(1)

(b)

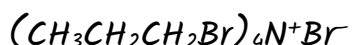
$\text{CH}_3\text{CH}_2\text{CN}$ can be reduced to form propylamine.

(1)

(c)

The route to propylamine from $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$ via nucleophilic substitution typically results in a less pure product due to further substitution or side reactions.

As an impurity, one possibility is the formation of a quaternary ammonium salt:

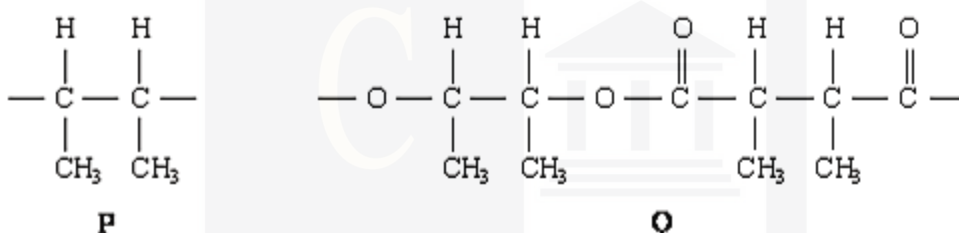


This quaternary ammonium salt may form due to further substitution reactions involving multiple equivalents of propylamine, resulting in the quaternization of the amine group by another molecule of 1-bromopropane.

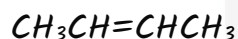
Additionally, byproducts such as HBr/ NH₄Br may also be present in the reaction mixture.

(3)

7. (a)



Monomer used to form polymer P:

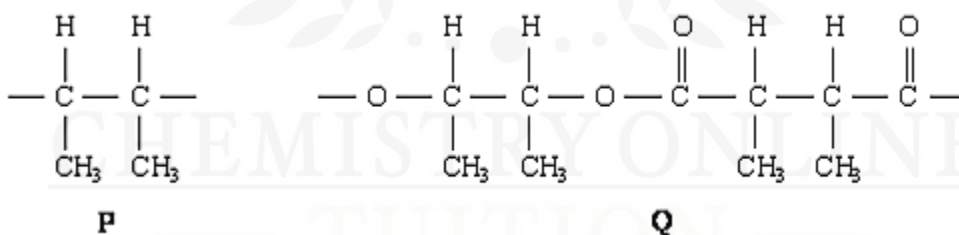


Name the type of polymerization :

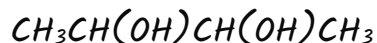
Addition / radical

(2)

(b)



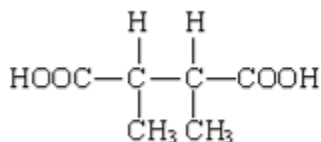
Structure of compound I:



Name of compound I:

butan(e)-2,3-diol

Structure of compound 2 :



Name of compound 2:

2,3-dimethylbutan(e)dioic acid

Type of polymerization:

Condensation

(3)

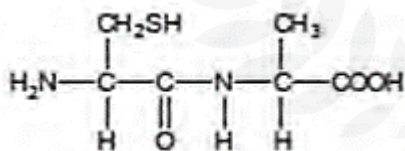
(c)

NaOH or HCl etc or Na₂CO₃ can be a compound which, in aqueous solution, will break down polymer Q but not polymer P.

(2)

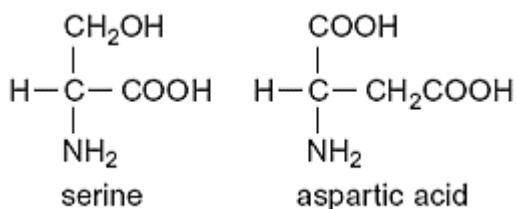
8.

Following is an alternative dipeptide that could be formed by these two amino acids.



(1)

9.



I am Sorry !!!!!

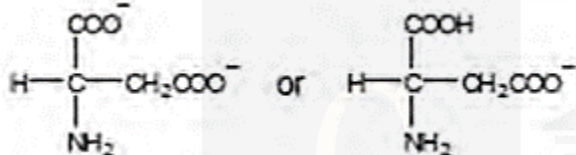
(a)

IUPAC name of serine:
2-amino-3-hydroxypropanoic acid

(1)

(b)

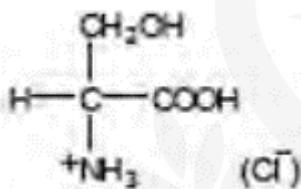
Following species can be formed when aspartic acid reacts with aqueous sodium hydroxide:



(1)

(c)

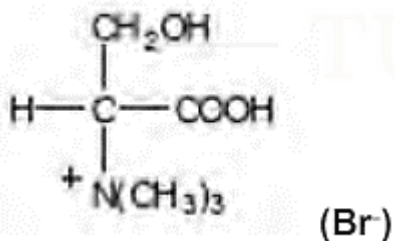
Following species can be formed when serine reacts with dilute hydrochloric acid:



(1)

(d)

Following species can be formed when serine reacts with an excess of bromomethane.



(1)

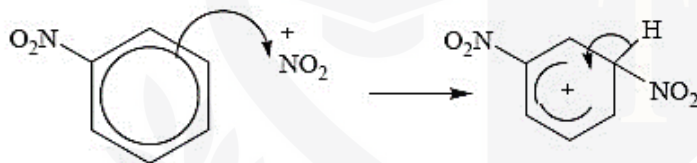
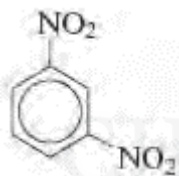
10.

(a)

Inorganic species: NO_2^+ formed from the two acids*Equation:*

(2)

(b)

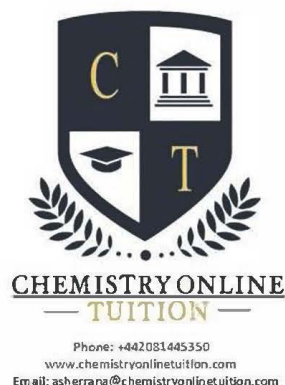
*Name:**Electrophilic substitution**Mechanism:**Product :*

(4)

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DR. ASHAR RANA



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

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