Quadrant IV – Assessment (Module –wise)

Programme: Bachelor of Science (Third Year)

Subject: Chemistry

Paper Code: CHC 107

Paper Title: Organic Chemistry

Unit: 04

Module Name: Structure, Resonance, Stability & Industrial source of Thiophene

Module No: 21

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MCQ

1) Choose the correct statement about thiophene from the following.
a) Thiophene has oxygen atom in it
b) Thiophene is electron rich heterocyclic compound
c) Thiophene is non-aromatic compound
d) Thiophene is acyclic sulphur containing compound

2) Which product is obtained on treatment of n-butane with sulphur at 560 °C?
a) Thiophene
b) Thietane
c) Thiane
d) Thiirane

3) Choose the correct statement about resonating structures of thiophene from the following.
a) Thiophene has eight resonating structures
b) All the resonating structures of thiophene have charge separation
c) All the resonating structures of thiophene contributes equally to the resonance hybrid
d) Thiophene has non-equivalent resonating structures which do not equally contribute to the resonance hybrid

4) Identify the correct aromaticity order for thiophene, pyrrole and furan.
a) Furan > Pyrrole > Thiophene

b) Pyrrole > Furan > Thiophene
c) Thiophene > Pyrrole > Furan
d) Thiophene > Furan > Pyrrole

5) Thiophene is an heterocyclic compound because
a) Sulphur heteroatom is a part of the ring
b) Four carbons are involved in the ring
c) It is a 5-memebered ring
d) It is cyclic and planar ring

Answers:
1) b
2) a
3) d
4) c
5) a

Completion type (fill-in-the-blanks)
1) The dipole moment is directed towards _____ atom in thiophene.

2) Among pyrrole, thiophene and furan, the most aromatic heterocyclic compound is _____.

3) The _____ effect is more significant than mesomeric effect in thiophene.

4) Thiophene is obtained by passing a mixture of _____ and hydrogen sulfide through a tube containing alumina at 400 ^{o}C.

True or False
1) Thiophene is an aromatic compound.
2) Thiophene is electron deficient heterocyclic compound.
3) Thiophene is comparatively more stable than pyrrole or furan.
4) All the resonating structures of thiophene contribute equally to the resonance hybrid.

Answers:
1) True
2) False
3) True
4) False

Short Answer – I (short notes - say 20 to 50 words)

1) Why thiophene is an aromatic compound?
2) Give any two physical properties of thiophene.
3) Comment on the dipole moment of thiophene.
4) Thiophene is comparatively more stable than pyrrole or furan. Justify the statement.
5) Thiophene is more aromatic than pyrrole or furan. Justify the statement.

Short Answer – II (extended – say 50 to 100 words)

1) Give all the resonating structures of thiophene along with the stepwise mechanism and explain their contribution towards the resonance hybrid.
2) Give any two industrial sources of thiophene.

Matching type

1) Match the following pairs about thiophene:

i) Aromatic	a) Sulphur heteroatom is a part of the ring
ii) Heterocyclic	b) Cyclic, planar and has conjugated 6π electrons
iii) Preparation	c) Non-equivalent
iv) Resonating structures	d) Heating sodium succinate with P_2S_3

Answers:

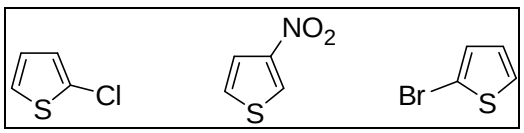
i) : b)
ii) : a)
iii) : d)
iv) : c)

Numerical/Problems to Solve

Self-reflection

Create something new (higher order cognition)

1) Write all the possible resonating structures for the following thiophene derivatives.



2) Find out more methods of preparation of thiophene.

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