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Chemistry

SUB. CODE- BSCC2402

For B.Sc. 4th Semester

(Heterocycles) **Module-III**

Thiophene

By

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ODISHA**

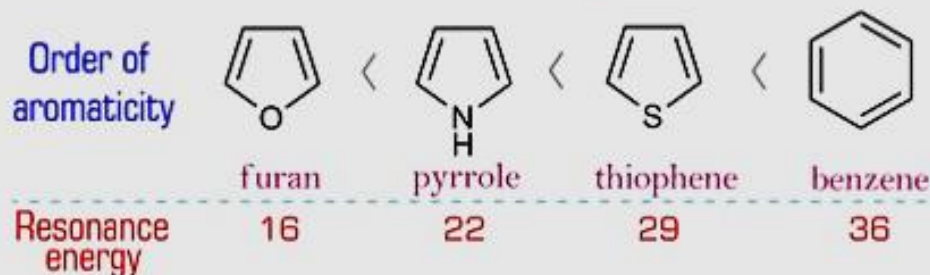
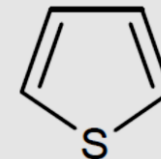


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Thiophene

It is a colorless liquid with a benzene-like odor. In most of its reactions, it resembles benzene.



- This order depends on order of electronegativity of heteroatoms
- The more e⁻ve is the atom → the more tightly holds its lone pair of e⁻ → more reduce the *ease of delocalization (aromaticity)*.
- So most e⁻ve O in furan most decrease aromaticity.
& Least e⁻ve S in thiophene least decrease aromaticity.

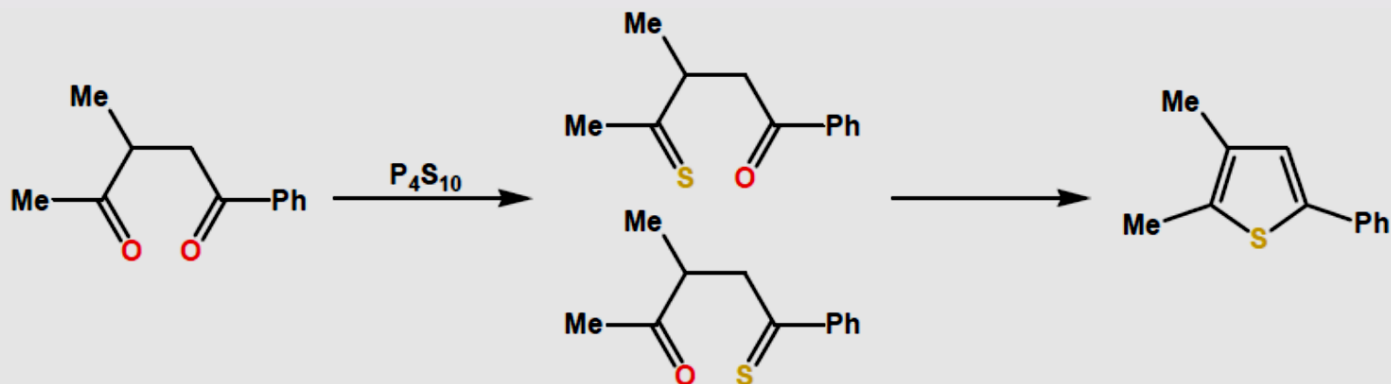


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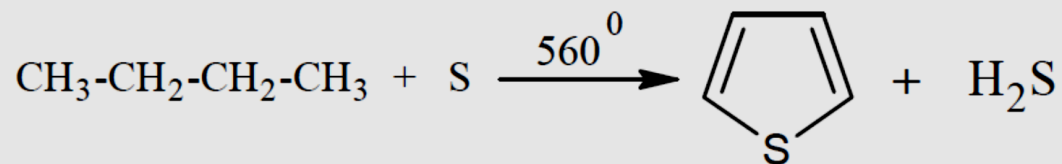
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Synthesis

Synthesis of Thiophenes by Paal Knorr type reaction



Thiophene can be synthesized on industrial scale by the high temperature reaction between n-butane and Sulfur.

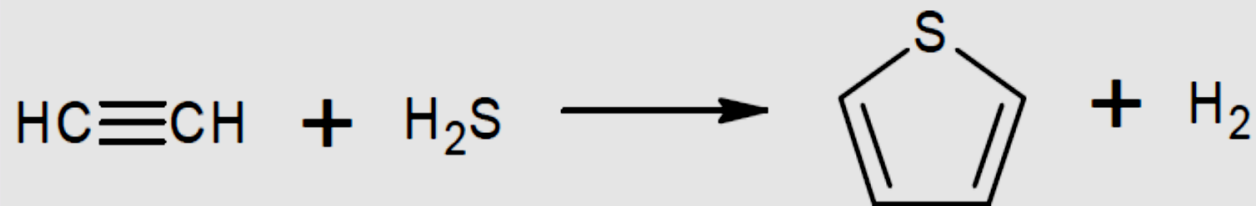




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Thiophene can be synthesized by passing a mixture of acetylene and hydrogen sulfide through a tube containing alumina at 400°C. This method is commercially used.



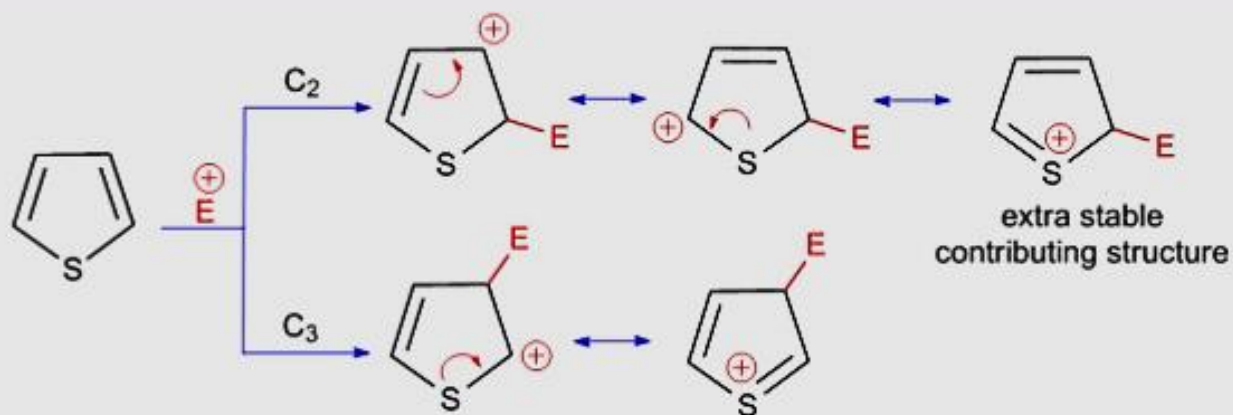


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Reactions



2 reasons...

- C2 attack gives more resonance contributing structures than C3.
- Extra stable contributing structure generates upon C2 attack

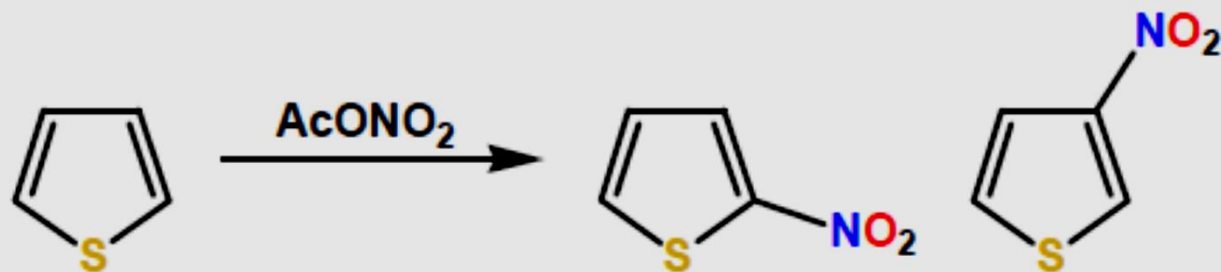


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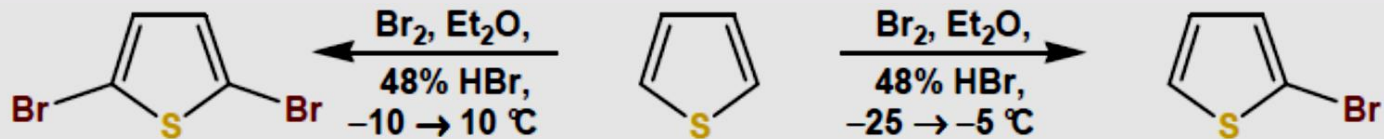
Reactions

1. Nitration of Thiophenes



Reagent AcONO_2 generated *in situ* from conc. HNO_3 and Ac_2O

2. Halogenation of Thiophenes



- Occurs readily at room temperature and even at -30°C
- Careful control of reaction conditions is required to ensure mono-bromination

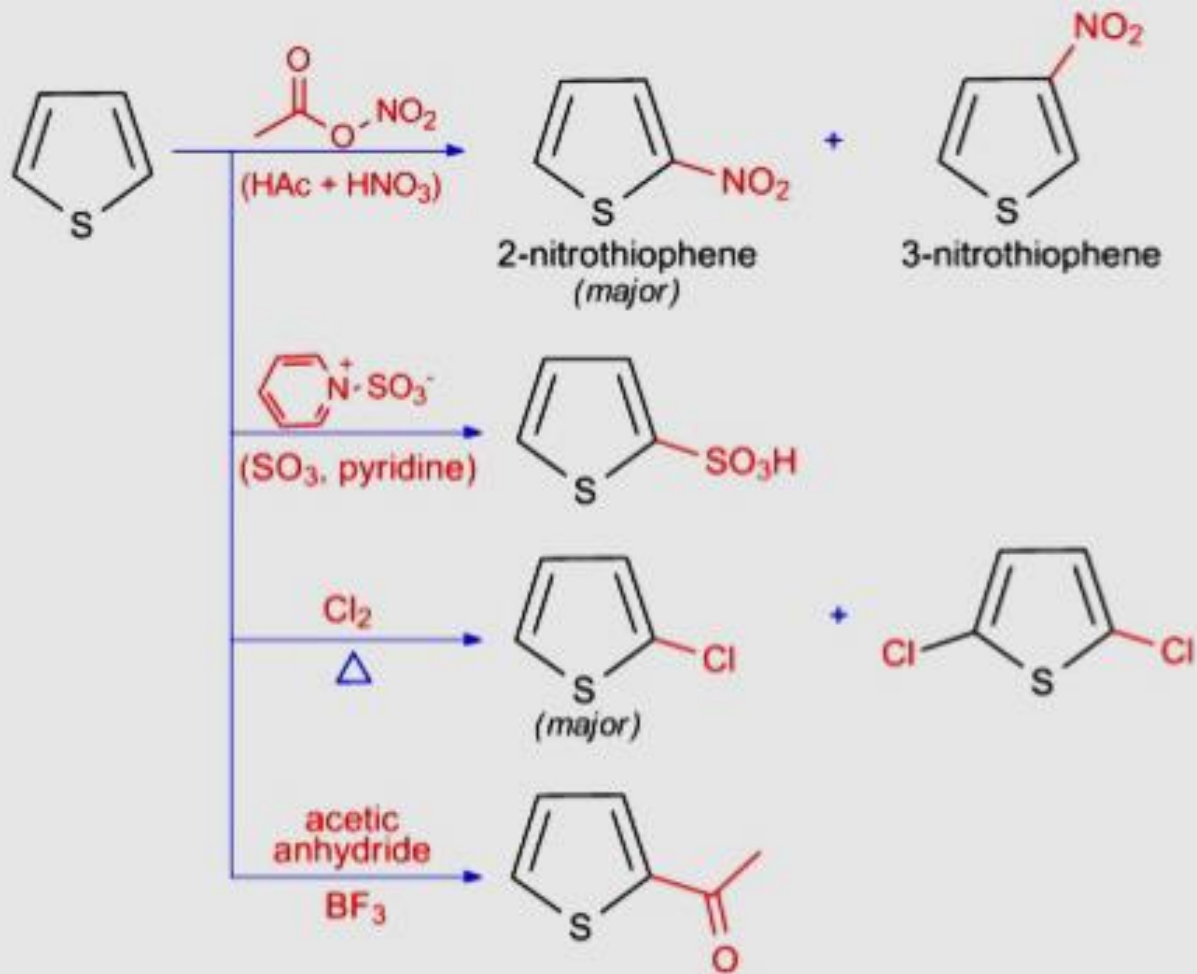


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Reactions





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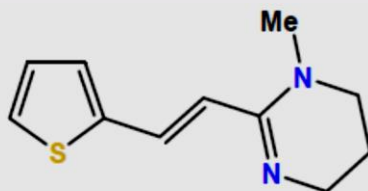
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Reactions

reaction with organolithium



Thiophene unit in bioactive products



banminth

Anthelmintic agent and is used to treat worms in livestock



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References

1. K.D Sharma and Y. R. Sharma, Kalyani Publishers, Unit-III page-278;
2. University Chemistry, Vol-IV, Dr. U. N. Dash, Dr. KK. Ojha, Himalaya Publishing house, Unit IV, page- 361