

# AROMATICITY

**LIFE SCIENCE II B**

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# Aromaticity

## Criteria for Aromaticity:

1. It must have a delocalized cyclic cloud of  $\pi$  electrons above and below the plane of the molecule.

- ❖ For the  $\pi$  cloud to be cyclic, the molecule must be cyclic.
- ❖ For the  $\pi$  cloud to be uninterrupted, every atom in the ring must have a  $p$ -orbital.
- ❖ For the  $\pi$  cloud to form, each  $p$  orbital must overlap with the  $p$  orbitals on either side of it.
- ❖ The molecule must be planar.

2. The  $\pi$  cloud must contain an odd number of pairs of  $\pi$  electrons.

3. Follow  $(4n + 2)$   $\pi$  electrons rule.

**$(4n + 2)$   $\pi$  electrons Rule:** The rule states that for a planar, cyclic compound to be aromatic, its uninterrupted cloud must contain  $(4n + 2)$   $\pi$  electrons, where  $n$  is any whole number.

## Antiaromatic:

A compound is classified as being antiaromatic if it fulfills the first criterion for aromaticity but does not fulfill the second criterion. *i.e.*

- ❖ It must be a planar.
- ❖ The  $\pi$  cloud must contain an *even* number of pairs of  $\pi$  electrons.
- ❖ The  $\pi$  cloud must contain  $4n$   $\pi$  electrons, where  $n$  is any whole number.

**Non-aromatic compounds:** A compound is said to be non-aromatic if it is neither aromatic nor anti-aromatic.

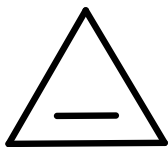
**Homoaromatic compounds:** Diatropic compound that contains one or more  $sp^3$  hybrid carbon is known as homoaromatic compound and aromaticity of these compounds are known as homoaromaticity.

Reference: **1. Organic Chemistry 4<sup>th</sup> Edition by Paula Yurkanis Bruice**

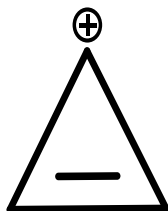
**2. Advanced Organic Chemistry by Jagdamba Singh and L.D.S. Yadav**

Classify given compounds/ions as aromatic, non-aromatic, antiaromatic and homoaromatic

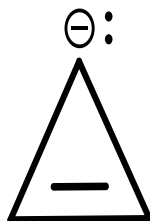
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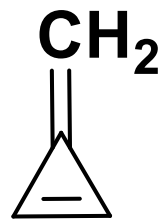
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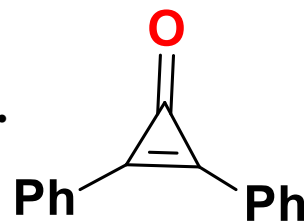
4.



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6.



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