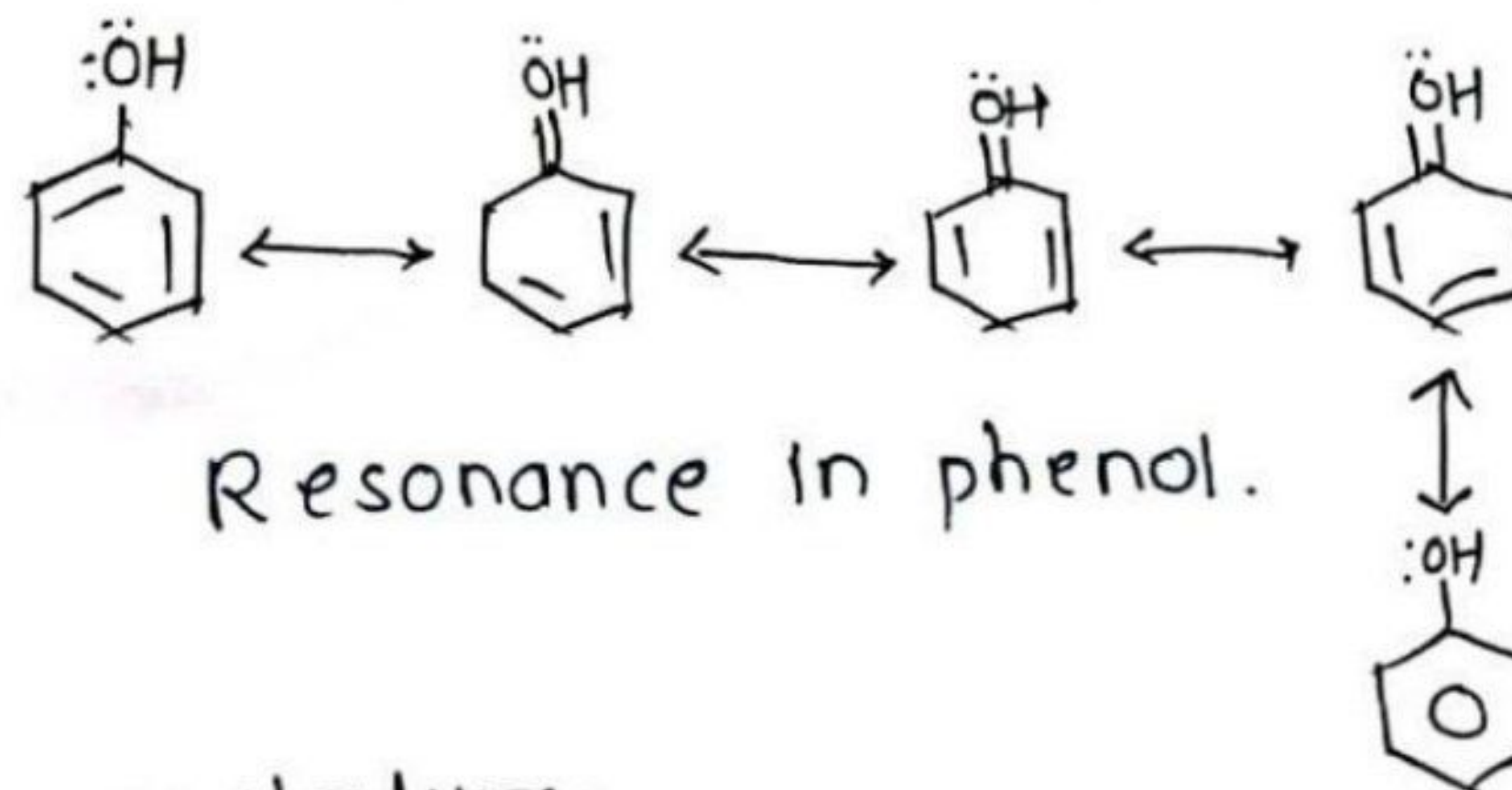


PHENOL:

- Aromatic compound contain OH-group directly attach to an aromatic ring.
- phenol have general formula Ar-OH where Ar may be phenyl (or) substituted phenyl ring.

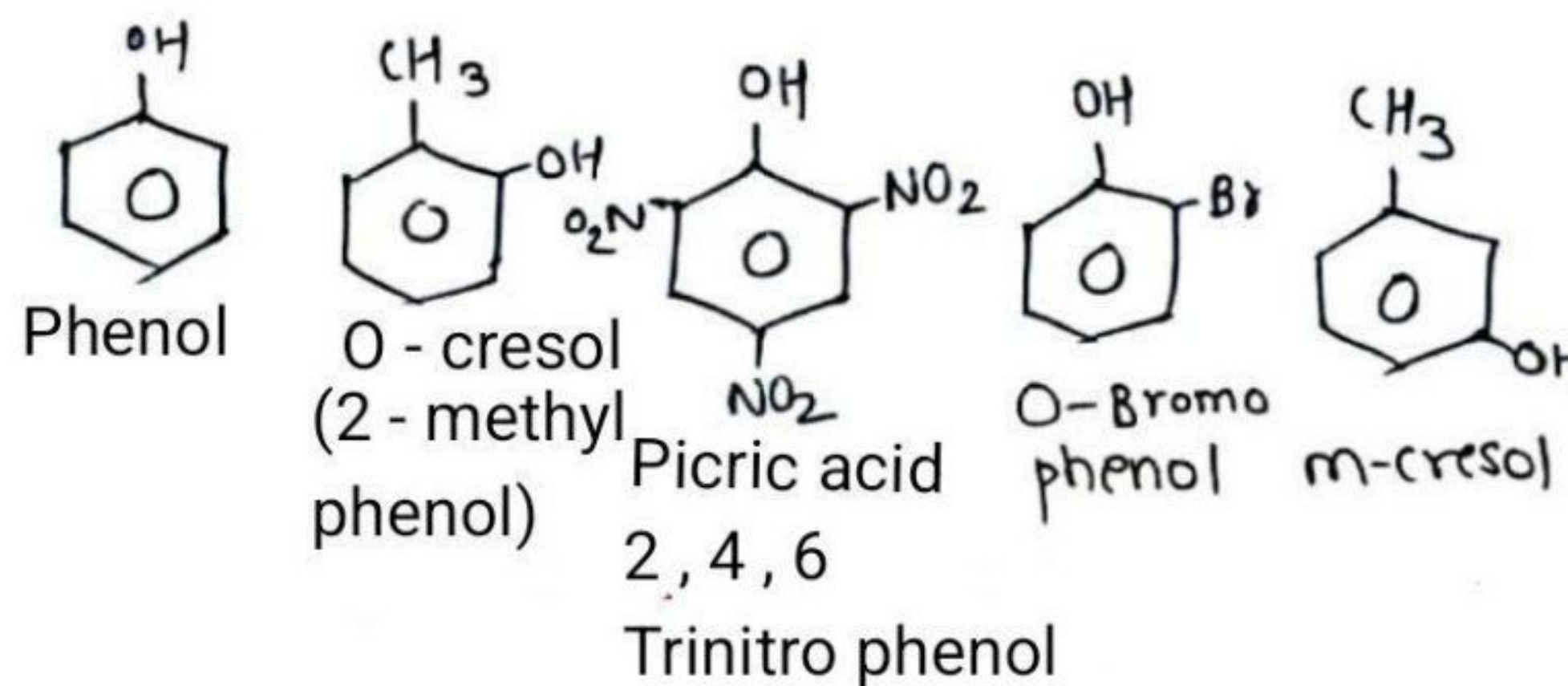
Structure:

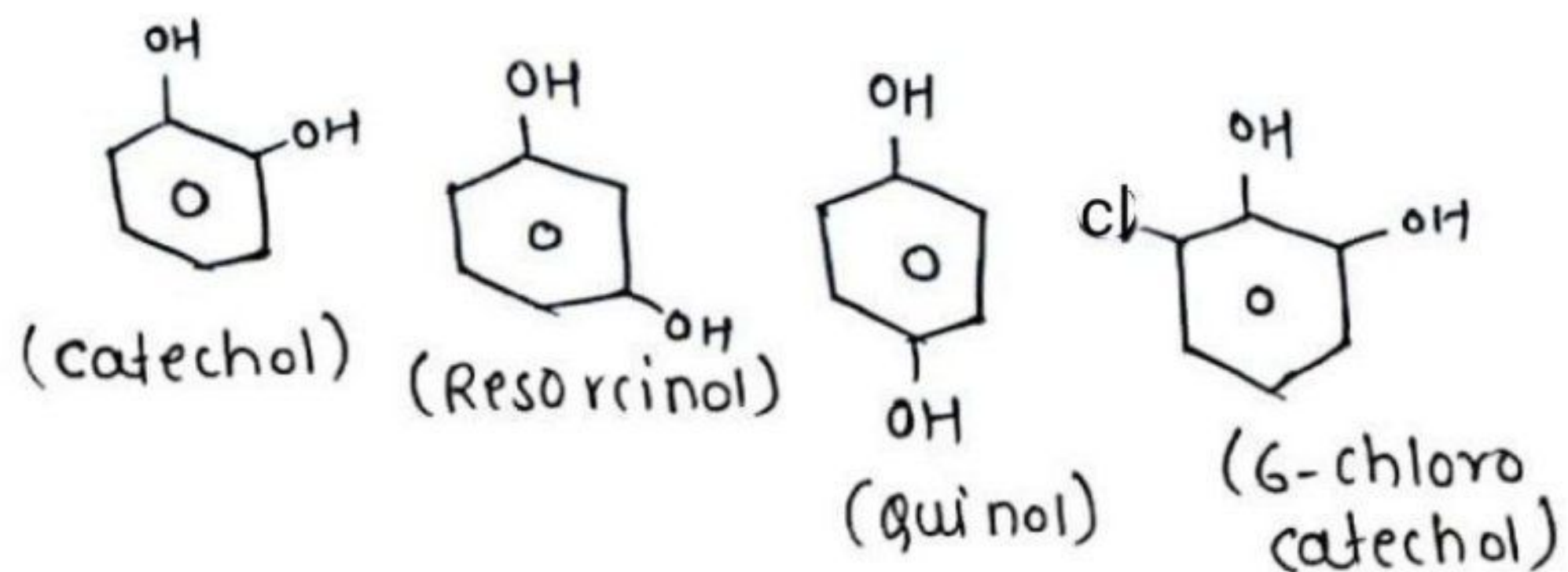
- The structure of phenol are quite similar to Aliphatic Alcohols.
- The one major diff. in phenol & Aliphatic alcohol is the fully filled sp^3 Hybrid orbital containing e^- attached by the aromatic π system.
- Due to participation of non-bonding e^- the carbon-oxygen bond fills some double bond character so that C-O bond stronger & shorter than aliphatic alcohol.



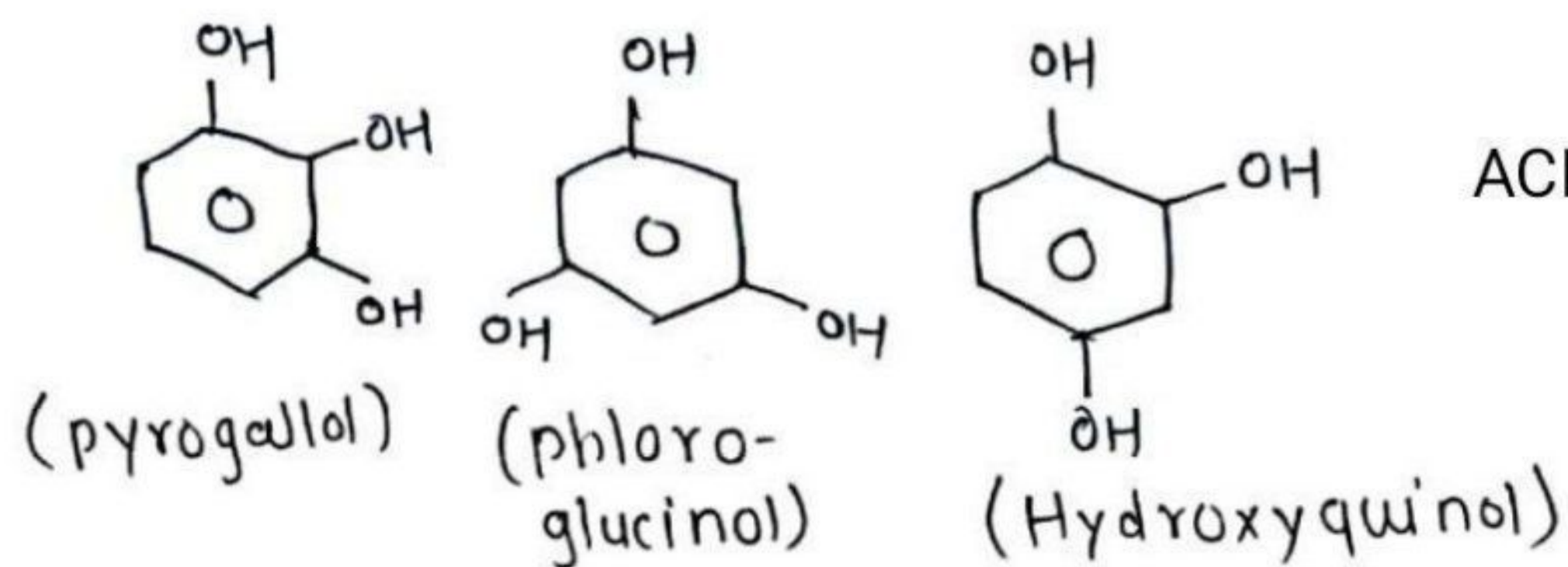
• Nomenclature:

- This may be monohydric, dihydric, (or) Trihydric on the basis of number of OH groups.

① Monohydric phenols:

② Dihydric Phenols:

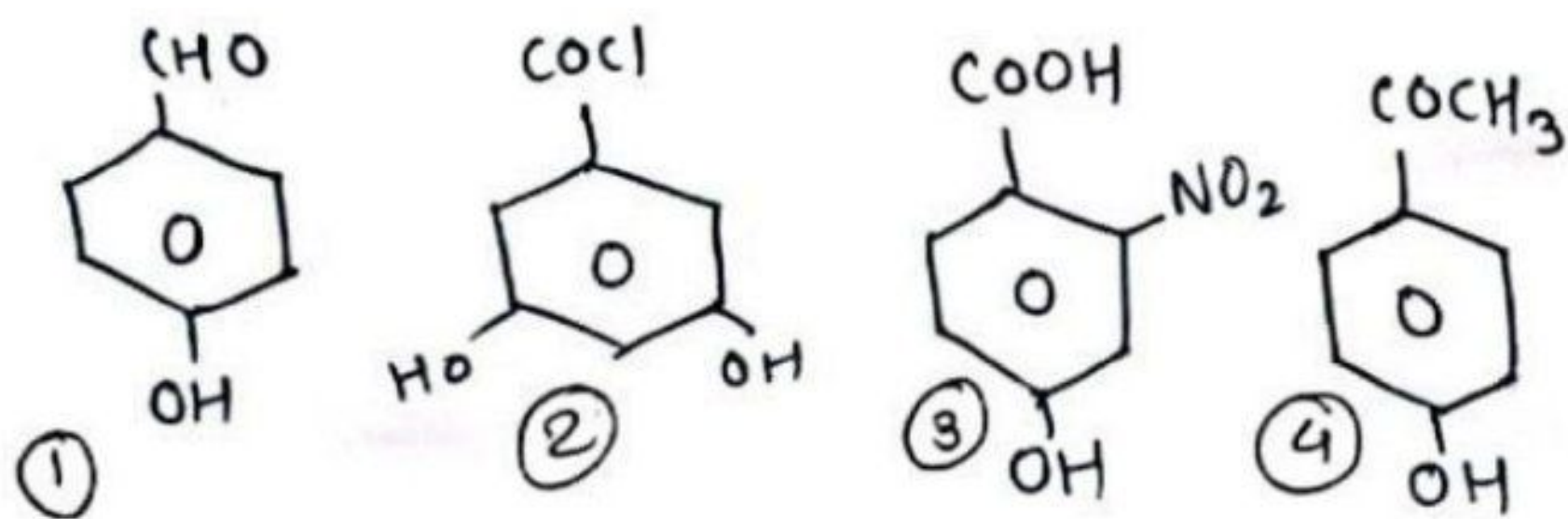
③ Trihydric Phenols : [DEPTH OF BIOLOGY]



ACIDITY

Acids	Formula	Ka Value (approx.)
Carboxylic acid	R-COOH	10^{-5}
Carbonic acid	H ₂ CO ₃	10^{-7}
phenols	Ar-OH	10^{-10}
Alcohols	R-OH	10^{-18}

④ OH Group as substituent:



- 1) Hydroxy Benzaldehyde
- 2) 3,5, dihydroxy Benzaldehyde
- 3) 4-Hydroxy 2-Nitrobenzoic acid.
- 4) 4-Hydroxy acetophenone.

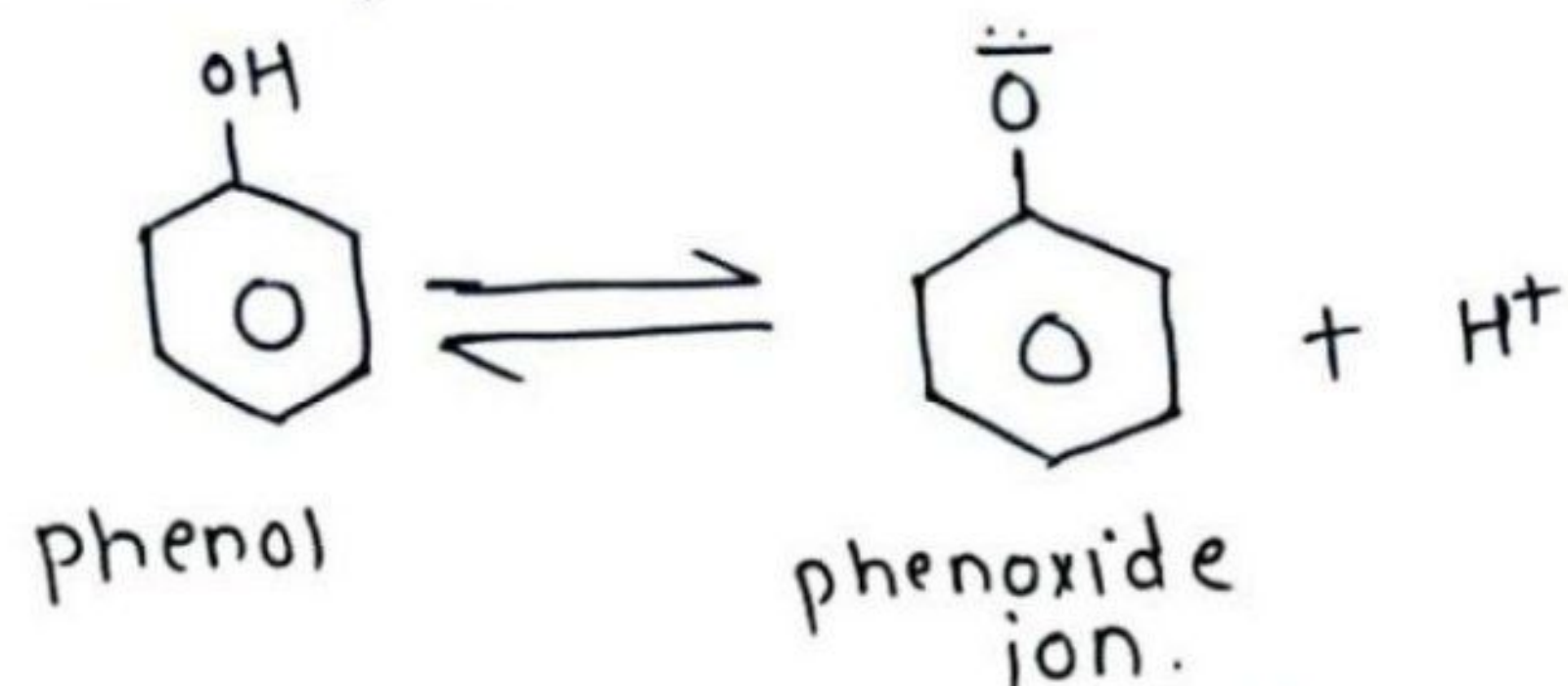
★ Acidity of phenol:

- phenols are acidic due to the formation of stable phenoxide ions in aqueous solution.

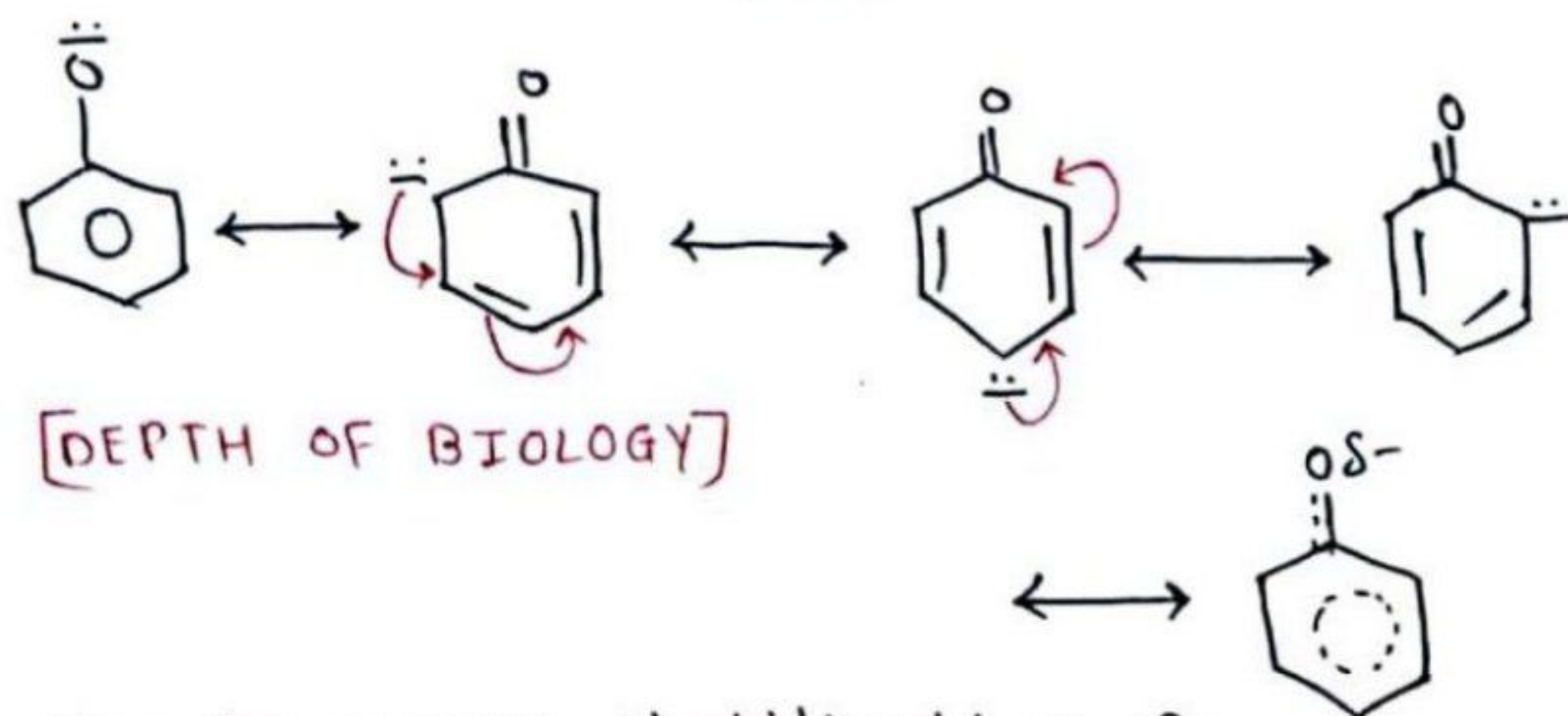
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for example,



(stable due to resonance).



[DEPTH OF BIOLOGY]

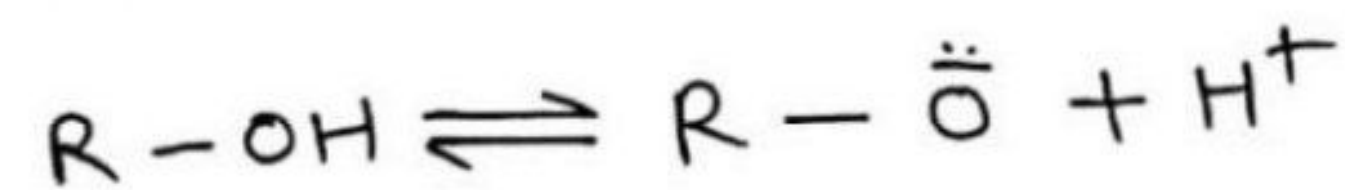
fig: Resonance stabilisation of phenoxide ion.

- The negative charge spread throughout the Benzene ring.
- This charge delocalisation is a stabilising factor in the phenoxide ion.

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- on the other hand, no resonance is possible in alkoxide ions ($R-O^-$) formed by dissociation of alcohols.



- The -ve charge is concentrated on a single oxygen atom, thus alcohols are weakly acidic than phenols.

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- The resonance stabilization of phenols makes it easy to leave H^+ ions and form phenoxide ion.
- While resonance in phenoxide ions makes it more acidic than alcohol.

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