

Benzene

Chemistry

Why benzene resists addition, and what it does instead.

Benzene is a planar six-carbon ring with six delocalised pi electrons above and below the plane, giving it extra stability compared with the hypothetical alternating-bond structure.

DELOCALISATION ENERGY

~152 kJ/mol

REACTION TYPE

substitution

- All six C-C bonds are identical, intermediate between single and double.
- Hydrogenation is ~152 kJ/mol less exothermic than predicted — the delocalisation energy.
- It undergoes electrophilic substitution, not addition.
- Nitration: conc. HNO_3 and H_2SO_4 , 50°C .
- Friedel-Crafts: alkylation and acylation with AlCl_3 .
- Halogenation needs a halogen carrier.

LOOK FOR IT

Bromine water is decolourised by an alkene and not by benzene — that is the practical distinction.

Substituting preserves the delocalised ring; adding would destroy it and lose the stabilisation. That is the whole reason.