



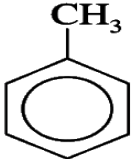
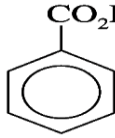
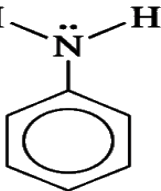
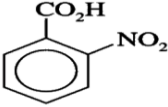
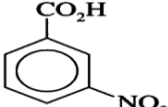
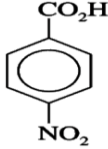















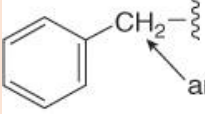
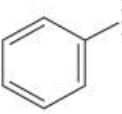
## Organic chemistry: Dr.Gehan abdelhafez.

Student: Mohamed Mokhtar

### ملخص المحاضرة الأولى

QUESTION	ANSWER
What is the definition of Aromatic hydrocarbons?	compounds such as benzene and related compounds that are similar in their chemical behavior with benzene.
What is benzene?	Is the simplest aromatic hydrocarbon (or arene). Has six electrons. ( <b>Resonance energy</b> )
What is the structure of benzene	Resonance hybrid of the two Lewis structures, with the dashed lines of the hybrid indicating the position of the $\pi$ bonds.
What is the definition of aromaticity?	Aromaticity refers to the special stability of cyclic, planar, fully conjugated compounds that follow Hückel's rule ( $4n+2 \pi$ electrons).
What are the conditions required for aromaticity?	A molecule must be <b>cyclic, planar, completely conjugated</b> , and follow <b>Hückel's rule</b> ( $4n+2 \pi$ electrons).
What is the difference between aromatic, antiaromatic, and non-aromatic compounds?	<b>Aromatic:</b> cyclic, planar, conjugated, $4n+2 \pi$ electrons. <b>Antiaromatic:</b> cyclic, planar, conjugated, $4n \pi$ electrons. <b>Non-aromatic:</b> lacks cyclic, planarity, or conjugation.
Give examples of aromatic, antiaromatic, and non-aromatic compounds.	<b>Aromatic:</b> benzene, pyrrole, tropylium ion. <b>Antiaromatic:</b> cyclobutadiene, cyclopentadienyl cation. <b>Non-aromatic:</b> cyclohexane, 1,3-cyclohexadiene.
What is definition of resonance energy	The difference between the hypothetical and observed heats of hydrogenation for benzene is called <b>Resonance Energy= 36 kcal/mol</b> .
What is the resonance energy of benzene?	<b>36 kcal/mol</b> that is much more stable than would be expected
What are the properties of benzene?	Benzene is $C_6H_6$ , Hexagonal ring, planar, $sp^2$ hybridized, bond angle $120^\circ$ , bond length $1.39 \text{ \AA}$ , aromatic by Hückel's rule.
What is Kekulé's structure of benzene?	Kekulé structure suggests <b>alternating double and single carbon-carbon bonds</b> , but the true structure is <b>a resonance hybrid with delocalized <math>\pi</math> electrons</b> .

### PART ONE OF THE LECTURE

<p><b>What Ladenburg said about it? (1869)</b></p>	<p>attacked Kekulé's formula, Thus there should be <b>two ortho-derivatives, 1,2-and 1,6-;</b> but these have never been observed in practice.</p>																				
<p><b>What is the definition of the Stability of Benzene</b></p>	<p>Benzene is much more stable than would be expected based on calculations for cyclohexatriene. "Resonance Energy"</p>																				
<p><b>Important molecules</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>Toluene</b></p> </div> <div style="text-align: center;">  <p><b>Benzoic acid</b></p> </div> <div style="text-align: center;">  <p><b>Aniline</b></p> </div> </div>																				
<p><b>How are benzene derivatives named?</b></p>	<p>By using prefixes (<b>ortho-, meta-, para-</b>) or numerical locants. The substituents should be listed in <b>alphabetical</b> order.</p>																				
<p><b>Give examples</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>2-Nitrobenzoic acid</b> (<i>o</i>-nitrobenzoic acid)</p> </div> <div style="text-align: center;">  <p><b>3-Nitrobenzoic acid</b> (<i>m</i>-nitrobenzoic acid)</p> </div> <div style="text-align: center;">  <p><b>4-Nitrobenzoic acid</b> (<i>p</i>-nitrobenzoic acid)</p> </div> </div>																				
<p><b>What is Hückel's rule?</b></p>	<p>Hückel's rule states that aromatic compounds must have <math>4n+2</math> <math>\pi</math> electrons (<math>n = 0,1,2,\dots</math>).it should contain an odd number of <math>\pi</math> electron pairs"</p>																				
<table border="0" style="width: 100%; text-align: center;"> <tr> <td>benzene</td> <td>hexatriene</td> <td>cyclohexane</td> <td>cyclopentadiene</td> <td>pyrrole</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><math>\pi 6 =</math></td> <td><math>\pi 6 =</math></td> <td><math>\pi 0 =</math></td> <td><math>\pi 6 =</math></td> <td><math>\pi 6 =</math></td> </tr> </table>	benzene	hexatriene	cyclohexane	cyclopentadiene	pyrrole						$\pi 6 =$	$\pi 6 =$	$\pi 0 =$	$\pi 6 =$	$\pi 6 =$	<table border="0" style="width: 100%; text-align: center;"> <tr> <td style="color: blue;">Aromatic</td> <td style="color: red;">NON</td> <td style="color: red;">NON</td> <td style="color: red;">NON</td> <td style="color: blue;">Aromatic</td> </tr> </table>	Aromatic	NON	NON	NON	Aromatic
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Aromatic	NON	NON	NON	Aromatic																	
<p><b>Difference between phenyle group and benzyle group.</b></p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>benzyl group</b> <math>C_6H_5CH_2-</math></p> </div> <div style="text-align: center;">  <p><b>phenyl group</b> <math>C_6H_5-</math></p> </div> </div> <p style="text-align: center;">an extra <math>CH_2</math> group</p>																				