

Organic Chemistry

Hydrocarbons

Grade 12 advanced 2020/2021

Prepared by

Mr / Naeem ElemamAkl

Volume (I)

Student's name:	
Class:	

هذه المذكرة لاتغني عن الكتاب المدرسي وليست بهدف البيع او الريح تمنياتي لجميع الطلبة والطالبات بالتفوق والنجاح Main idea: hydrocarbons are carbon-containing organic compounds that provide a source of energy and raw material ing over 1golg تدير مصد الإمار ione neer block CHEM 4YOU:

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ing over 1970.h تحير مصد الإعلم the gasoline and diesel fuel that are used in cars ,trucks and buses are hydrocarbons تعهر محمد الإصام Seeg neer lightly أحوم مصد الإصلم تحهر محمد الإصلر

تعهر محمد الإصام

items	Definition
Organic chemistry	Is the branch of chemistry study many organic compound that contain carbon atoms
Organic compound	Any compound have carbon atom except carbon oxides and carbonate
hydrocarbons	The simplest organic compounds which contain only the elements carbon and hydrogen
Saturated hydrocarbons	Hydrocarbon having only single bonds
Un Saturated hydrocarbons	A hydrocarbons that has at least one double or triple bond between carbon atoms
Fractional distillation (fractionation)	That method used to separate raw petroleum (crude oil) into simpler components or fractions which involves condense at different temperature and it is done in fractionating tower
cracking	That process which heavier fractions are converted into gasoline by breaking their large molecules into smaller molecules
Octane number	Used to give antiknock rating of fuel (mixture from iso octane and heptane) Ocane number of iso octane =100%
	Octane number of heptane=0%

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Organic compounds:

- Chemists referred to the compounds which produced by living things as organic compounds because
- Once Daltons atomic theory was accepted chemists began to under stand that compounds including those made by living organisms consisted of arrangements of atoms bonded together in certain combination

Vitalism (vital theory):

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 According to vitalism organisms possessed a mysterious "vital force " enabling them to assemble carbon compounds

carbon compounds Disproving vitalism:

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✓ Friedrich Wohler was the first scientist to realize that he had produced an organic compound called urea by synthesis in laboratory

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 Eventually the idea that the synthesis of organic compound required a vital force was discredited and scientists realized they could synthesize organic compounds in the laboratory

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Organic chemistry:

 Organic compounds that are compounds have carbon atoms except of carbon oxides, carbides and carbonates

Carbon atom is

- ✓ an element in group14
- ✓ electron configuration 1S²,2S²,2P²

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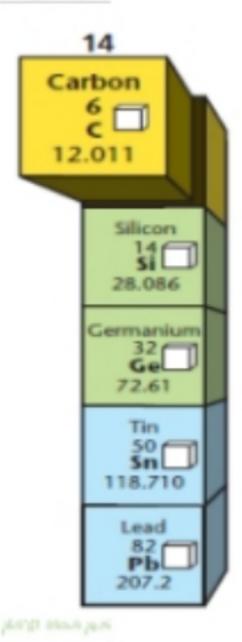
تعور شحفد الإضار

- Shares its electrons and forms four covalent bonds
- ✓ Bonded to H atoms or atoms of other elements that are near carbon in the periodic table -especially N,O,S,P and the halogens

Organic compounds are millions and various ?why?

Because the electronic configuration of carbon atom make it :

- Can Bonded to another carbon or another element making single or double or tipple bond
- Can bonded to other carbon atoms and form chains from 2 to thousands of carbon atoms in length
- ✓ It forms a complex , branched chain structures , ring structures and even cakelike structures



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Hydrocarbons :

- Are the simplest organic compounds
- Contain only the elements of C and H
- The simplest hydrocarbon molecule CH4 methane
- MethaneCH4 :excellent fuel and is the main component of natural gas

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أخير شعاد الإشار

تحير معدد الإعلر

تحور محد الإعلر

♦ Models and hydrocarbons :

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- Chemists represent organic molecules in a variety of four ways:
- Keep in mind as you look at the models that the atoms are held closely together by electron -sharing bonds

	Molecular formula	Structural formula	Ball-stick model	Space-filling model
Model	dest may not place			played search part played search part played search part played search part and search part
Advantage	Represent kind and number of atoms in the molecule	Shows the general arrangements of atoms in the molecule	Demonstrates the geometry the molecule clearly	Give a more realistic picture of what molecule would look like if you could see it
disadvantage	information about	Not show the exact three dimensional geometry	ing over their ing over the	plant some peri plant some peri plant some peri

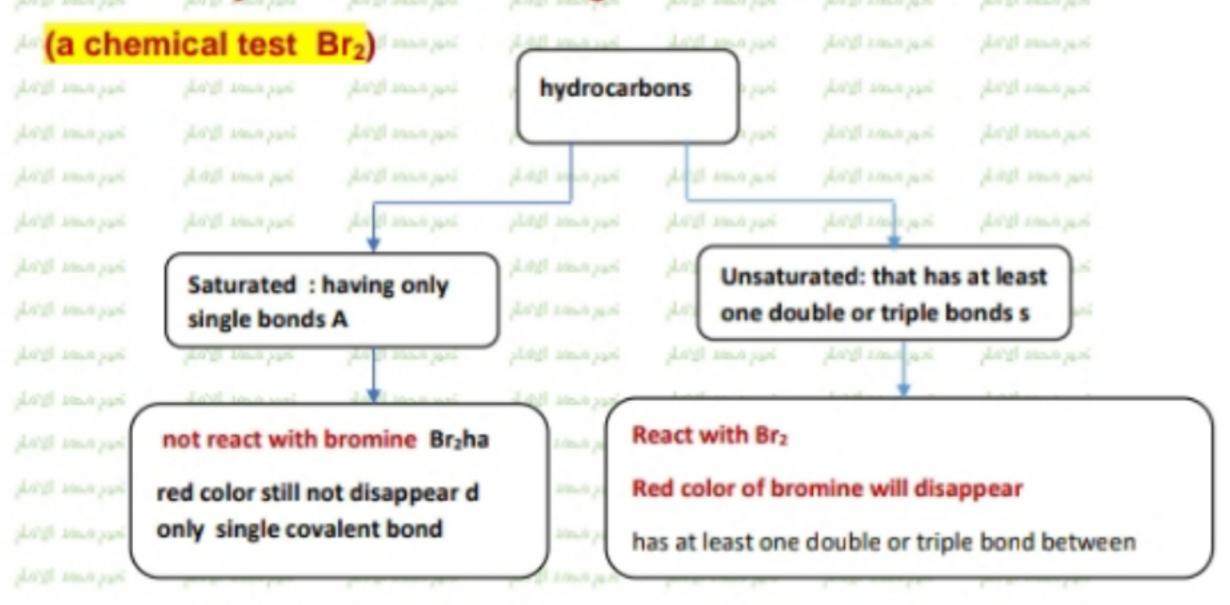
Multiple carbon -carbon bonds :

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 Carbon atoms can bond to each other by single covalent bond(one shared pair) or by double bond (2 shared pairs) and triple covalent bonds (tree shared pairs)



Classified hydrocarbons according to kind of covalent bond



Refining hydrocarbons :

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Many hydrocarbons are obtained from a fossil fuel called petroleum and natural gas .

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Fotmation of petroleum:

millions of years ago

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ing ozer lynk stay over likely تحور محد الإشار 1- Is formed from the remains of microorganisms that lived in earths oceans

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2- Over time the remains formed thick layers of mudlike deposits on the تحوم منحد الإصار تعهر محدد الإعلر تحور محفد الإشار تحوم محمد الإشار تحير شحفد الإنمار ocean floor

- 3- Heat from earths interior and the tremendous pressure of overlying sediments transformed this mud into oil rich shale and natural gas
- 4- The petroleum ran out of the shale and collected in pools deep in earths second Role crust

Sections (No.1)

Formation of the natural gas

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كحوم شكت الإشلم تحهر شجفنا الإشلع is formed at the same time and in the same way as petroleum is usually found تحور محمد الإشام ing over though تحهر محتد الإتمار تحير محدد الإعلر with petroleum deposits

تحور فنحد الإضاء تحور شوفد الإشار is composed primarily of methane and asmall amounts of other hydrocarbons that have from 2C to 5C atom regions light, مورمصد الإملا تحوم فنحف الإشام تحير شحاد الإنطر

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fractional distillation (fractionation)

- ✓ Fractional distillation is a process used to separate raw petroleum (crude oil) into simpler components or fractions
- The raw petroleum sometimes called crude oil (why?)

 Because Petroleum is a complex mixture containing more than a thousand different compounds
 - Crude oil has little practical use and become more useful to humans when separated into simpler components or fractions
- ✓ Fractional distillation is done in a fractionating tower
- The temperature inside the fractionating tower is controlled so that it remains near 400°C at the bottom
 - The condensation temperature (boiling point) generally decrease as molecular mass decreases
- Where the petroleum is boiling and gradually decrease toward the top
- At the top of the tower: the components have low boiling point, lower density, lower molecular mass ,lower viscosity and higher volatile
- Gasoline and gaseous products have low b.p and are drawn off in the cooler regions near the top of the tower
- Oils and greases having much higher boiling points stay near the bottom of the tower and are drawn off there

One shared pair

Two shared pairs

C::C

C=C

Double covalent bond

Three shared pairs

-c≡c-

Triple covalent bond

- and = carbon electrons
- electron from another atom

Basic scientific of fractional distillation :

- Each components of petroleum different in boiling point
- and they condense at a different temperature

Figure 21.6 This diagram of a fractionating tower shows that fractions with lower boiling points, such as gasoline and gaseous products, are drawn off in the cooler — CH₄ to C₄H₁₀ Gases regions near the top of the tower. Oils and greases, having below 40°C much higher boiling points, stay near the bottom of the tower and are drawn off there. C₅H₁₂ to C₁₂H₂₆ Gasoline 40 - 100°C -— C₁₂H₂₆ to C₁₆H₃₄ Kerosene اعداد أ. نعيم الامام عقل 105 - 275°C 0508194296 — C₁₅H₃₂ to C₁₈H₃₈ Heating oil 240 - 300°C Furnace — C₁₇H₃₆ to C₂₂H₄₆ Lubricating SPECIAL PROPERTY AND ADDRESS. oil and grease BATTER STATE OF THE STATE OF TH above 300°C SECTION SECTION SECTION CONTRACTOR OF THE PARTY OF THE Steam Crude oil Chains larger than ju Residue C20H42 ٨ A furnace heats the crude oil The molecular mass of the į. to boiling, and the resulting hydrocarbon determines. gases travel to the tower. how high it rises in the tower.

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cracking:

Is a process in which heavier fractions are converted to gasoline by breaking their large molecules into smaller molecules تجرمه الإمار تجرمه الإمار تجرمه الإمار

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Conditions of cracking:

✓ Is done in the absence of oxygen

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And in the presence of a catalyst



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Don't yield fractions in same proportions they are needed fore example distillation seldom yield the amount of gasoline desired however it yields more of the heavier oils than the market demands

Rating gasoline :

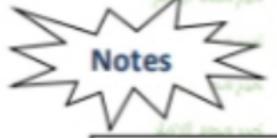
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- Gasoline is not a pure substance but rather a mixture of hydrocarbons
- Gasoline have 5 to 12 carbon atoms
- The gasoline fraction that is distilled from petroleum is modified by adjusting its composition and adding substances to improve its تحور شهد الإفلر performance in todays automobile engines and to reduce pollution from car exhaust أحير معط الإضار
 - It is critical that the gasoline air mixture in the cylinder of an automobile تحير شعت الإشام engine ignite at exactly the right instant and burn evenly
 - If it ignites too early or too late much energy will be wasted , fuel efficiency will drop and the engine will wear out prematurely
 - Early ignition causes a rattling or pinging noise called knocking
 - Several factors determine which octane rating a car needs including
 - How much the piston compresses the air-fuel mixture

Seer neer lightly

The altitude at which the car is driven

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- As the united states entered the machine age and its population increased the demand for petroleum products
- Edwin drake drilled the first oil well in the U.S.A in Pennsylvania in 1859

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When tomasEdison introduced the electric light inventors feared that industry was doomed however the invention of automobile revived the industry on a massive scale

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ion and Work

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Section 2: alkanes

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Main idea: alkanes are hydrocarbons that contain only single bond

Chemistry for you: natural gas and propane are the two most common gases used in many applications and both are alkanes أحور محمد الإصلر icay name lightly

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Item	Definition			
Alkanes	Are hydrocarbons that have only single bonds between atoms			
A homologous series	A series of compounds that differ from one another by a repeating unit (CH ₂)			
Parent chain	The longest continous chain of carbon atoms			
Substituent groups (Alkyl group R-)	All side branches that group appear to substitute for ahydrogen atom in the straight chain and the ending in the alkane (ane) is replaced with (yl)			
Cyclic hydrocarbons	An organic compound that contains a hydrocarbon ring			
Cyclo alkanes	Cyclic hydrocarbons that contain only single bonds			
Skeletal structure	That formula that represent covalent bonds between carbon atoms without hydrogen			
Condensed structural formula	Like a structural formula but save space by not showing how the hydrogen atoms branch off from the carbon atoms and the lines between carbon atoms have been eleminated to save space			

Simple alkanes :

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Molecular Formula	Structural Formula	Ball-and-Stick Model	Space-Filling Model
Ethane (C ₂ H ₆)	H-C-C-H		-
Propane (C ₃ H ₈)	H H H H		
Butane (C ₄ H ₁₀)	H H H H H - C - C - C - H		

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Staight –chain alkanes

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- ✓ The smallest member of a series of hydrocarbons known as alkanes is methane CH₄
- ✓ The general formula of alkanes is C_nH_{2n+2}

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Alkanes with 5 carbons or more in a chain have names that use a prefix derived from the greek or latin word for the number of carbones in each chain

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تحير مصد الإملر

تحور محمد الإصلر

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Example: pentane has 5 carbon just as a pentagon have 5 sides, and octane has 8 carbon just as an octopus has 8 tentacles

A homologous series has a fixed numerical relationship among the number of atoms(C_nH_{2n+2}) where n: is equal to the number of carbon atoms in alkane.

Name	Molecular Formula	Condensed Structural Formula
Methane	CH ₄	CH ₄
Ethane	C ₂ H ₆	CH ₃ CH ₃
Propane	C ₃ H ₈	CH ₃ CH ₂ CH ₃
Butane	C ₄ H ₁₀	CH ₃ CH ₂ CH ₂ CH ₃
<u>Pent</u> ane	C ₅ H ₁₂	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃
<u>Hex</u> ane	C ₆ H ₁₄	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃
<u>Hept</u> ane	C ₇ H ₁₆	CH ₃ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃
<u>Oct</u> ane	C ₈ H ₁₈	CH ₃ (CH ₂) ₆ CH ₃
<u>Non</u> ane	C ₉ H ₂₀	CH ₃ (CH ₂) ₇ CH ₃
<u>Dec</u> ane	C ₁₀ H ₂₂	CH ₃ (CH ₂) ₈ CH ₃

> Common alkyl groups :

Mame Name	Methyl	Ethyl	Propyl	Isopropyl	Butyl
Condensed structural formula	CH₃—	CH ₃ CH ₂ —	CH3CH2CH2—	сн₃снсн₃	CH3CH2CH2CH2—
Structural formula	н-с-н	H - C - H	H-C-H H-C-H	H-C-H -C-H H-C-H	H-C-H H-C-H H-C-H

Page and Biblio

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Alkanes					
Straight chain		Branched chain			
Example : butane Uses : used in lighters and in troches And town part And town part And town part And town part And town part And town part And town part And town part And town part And town part And town part And town part And town part A		Isobutane Molecular formula: C ₄ H ₁₀			
 ✓ Have the same molecular formula ✓ Different in chemical and physica ✓ Used as raw materials for many of 	l prope	erties تعبر محدد الاصلم تعبر محدد الاصلم العملم تعبر محدد الاصلم تعبر محدد الاصلم تعبر محدد الاصلم تعبر محدد الاصلم			

A photo seasons تحير محدد الإصلم تحور محد الإشار iver, more lightly تحور محمد الإصام تحور محد الإشام ing over Well Note Sugarent Brodg Just man part تدير مصد الإمار heart base block hord some part the same of molecular formula for a straight chain and branched chain

illustrates abasic principle of organic chemistry تحير مصد الإملر Neg ozen Bolg

- The order and the arrangement of atoms in an organic molecule ing over light, icar, nates lightly determine its dentity
- 🗸 تحور محد الإمار The name of organic compound must also accurately describe the molecular structure of the compound تحير مصد الإملر



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Naming branched – chain alkanes :

To name organic structures chemists use the following systematic rules approved by the internaional union of pure and applied chemistry (IUPAC)

step1:count the number of carbon atoms in the longest continuous chain

Step2:number each carbon in the parent chain

Step3:name each alklyl group substituent

Step4: if the same alklyl group occurs more than once as a branch on the parent structure, use a prefix (di-, tri-, tetra-, ... and so on) before its name to indicate how many times it appears تحير محد الإعلر

Step5 :when different alkly groups are attached to the same parent structure place their names in alphabetical order

And don't cosider the prefixes (di-, tri-, ...) when determineing alphabetical order

Step6: write the entire name, using hyphens to separate numbers from words and commas to separate numbers كبير شجالا الإشار أحوم محمد الإشار أحير شحاد الإتمار

Example:

تحور محد الإصلر

Name the alkane shown:

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 CH_3

CH₂

CH₃CH₂CH₂CHCHCHCH₂CH₃

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عهر محدد الإنطر

CH₂ One ethyl group: no prefix Disch jane Ethyl Position and name: 4-ethyl تحور الحاك CH₃CH₂CH₂CHCHCHCH₂CH₃ Parent chain: octane نحهر شحانا 250.00 (0.00) Methyl Methyl Make Jani Two methyl groups: use dimethyl

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Position and name: 3,5-dimethyl

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Applications

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- 1- Use the IUPAC rules to name the following structures:
 - CH₂ CH₂ CH_3 CH3CHCH2CHCH2CH3 CH3CCH2CHCH3 CH₃ CH₃ CH₂ CH3CHCH2CH2CHCH3 CH₂
 - 2- Draw the strucures of the following branched- chain alkanes:

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تحور محمد الإتمار

- 2,3-di methyl-5-propyl decane
- 3,4,5-tri ethyl octane

Just some part

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تحوم محمد اللاملم





تحور مصد الإملر

تحير محمد الإمار

تحور شمت الإتمار

تحور مصد الإمار

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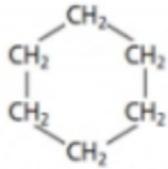
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- The simplist compound in cycloalkanes is cyclopropane
 - General formula of cycloalkanes is C_nH_{2n}
 - Seeg name lyndy Cycloalkanes have 2 fewer hydrogen atoms than straight -chain alkane أخير شمتد الإعلا (why?)

and Broke because a valence electron from each of 2 carbon atoms is now forming a carbon-carbon bond rather than a carbon- hydrogen bond تعور محدد الإعلر

- Cycloalkanes can be represented in several ways:
 - Condensed strucural formula
 - تحور شعفد الإشلر Skeletal structure: H atoms are not shownin formula
- Line structure :show only the c-c bonds with carbon atoms under stood to be at each vetex of the structure تحور مصد الإمار



Condensed structural formula

Naming substituted cycloalkanes :

تحوم شحفد اللافكر

تحوم محمد الزشام

تحور محمد الإشار

- تحير محد الإفطر الحير محد الإفطر Substituted cycloalkanes are named by following the same IUPAC rules used for straight -chain alkanes but with a few ing over thorte in a cover the print in a cover thorte modifications
- With cycloalkanes there is no need to find the longest chain because the ring is always considerd to be the parent chain
- Numbering is started on the carbon that is bonded to the بور محد الإمار substituent group because a cyclic structure has no ends

تعهر شحفد الإعلار

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✓ When there are 2 or more substituents, the carbons are numbered around. the ring in a way that gives the lowest - possible set of numbers for the substituents تحور محدد الإصلي تحود مصد الإصلي تحور محدد الإصلي

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تحيير محمد الإصلي

تحور منعد الإشار

If only one group is attached to the ring no number is necessary days mayor

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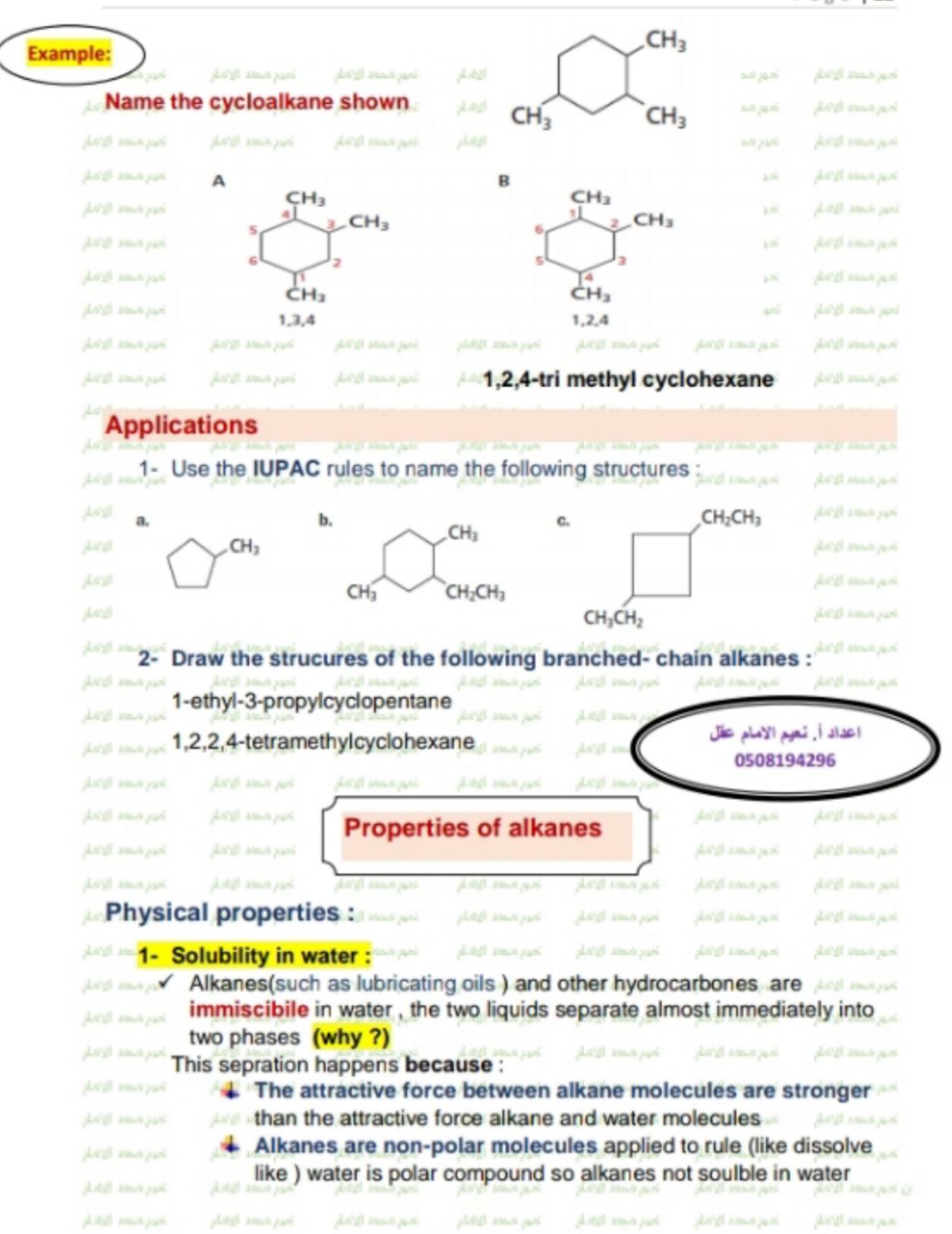


Skeletal structure Line structure

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Sections 150 fc



2- Melting point and Boiling point :

- Water and methane molecules are similar in size and are closed in molecular mass [Water (18amu), methane (CH4:16amu)] although that the boling point of water more than methane (why?)
- Because the methane molecules is non polar so it have little intermolecular attraction (london disprition forces) compared to water molecules which are polar and freely form hydrogen bonds
 - When molar mass of molecules increase the boiling point increase (why?) Sugarent Broke Sour name lightly Sections (No.5)
 - because increasing in molar mass of molecules the intermolecular force between molecules become more and it is need more energy to break it

تحور محمد الإضار

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تحور محصد الإشار

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تمهر محمد الإصلر

أحير مضد الإتمار

تحير محدد الإنطر

كيبر محتد الإشار If the organic compounds have the same molecular formula but different خير محد الإمار in structural formula the compound have more branches is low boiling point LOS MAN HAM Jan's same lightly Jean near Bink تحور منحد الإشار

تحور محد الإشام

3- The structure of a molecules affects

تحور محمد الإنمار

- The structure of a molecules affects its properties
- Water is polar solvent (why?) because the O-H place and pro bonds in a water molecule are polar and water molecule has a bent geometry thus water molecules can form a hydrogen bond to each other LOG HELD YOU as a result the boiling and melting points of water are much higher than those of other substances plays amayer having similar molecular mass and size

Substance and formula	Water (H ₂ O)	Methane (CH ₄)
Molecular mass	18 amu	16 amu
State at room temperature	liquid	gas
Boiling point	100°C	−162°C
Melting point	0°C	−182°C

- Alkanes are non-polar (why?) because the all AND HER YOR bonds in alkanes between either a carbon atomsC-C also C-H have only a small electronegativity difference and are non polar
- 4- Alkanes and cycloalkanes are good solvents (as thinners for paints , coatings ,waxes,photocopier toners,adhesives and printer press inks)for other non polar substances (why?) because Alkanes and cycloalkanes are nonpolar solvents plant some part تعور محدد الإصار

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Chemical properties of alkanes :

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تعهر محط الإعلا

تحور محدد الإشار

تحور محمد الإعار

Alkanes are low reactivity (why?) because:

a- Atoms in alkanes are connected by nonpolar bonds, have no charge .as are sult they have little attraction for ions or polaler molecules

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b- Can also be attributed to the relatively strong C-C and C-H bonds

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تحجر محدد الاعلم

تحير شحفد الإعلم

تحور مصد الإمار

تحور محتد الإملار

تحور محمد الإملار

تحهره مشد الإشار

تحور محمد الإخطر

Main idea: alkenes are hydrocarbons that contain at least one double bond and alkynes are hydrocarbons that contain at least one triple bond

تحور محط الإشام

Sections (Split

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تحور محمد الإتمار

فصر محمد الإصار

تحوم فحفد الإذ

غيير محد الإمار

أحوم شطتا الإشلع

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Chemistry for you:

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plants produce ethene as a natural ripening hormone . for efficiency in harvesting and transporting produce to market, fruits and vegetables are often picked while unripe and are exposed to ethene so they will ripen at the same time تحير محمد الإعلم ing need lynds تعهر محمد الإملار تحيذ محمد الإملار Park Jane 18,076 تحير محمد الإمار

Item	Definition			
Alkenes	That hydrocarbons contain one or more double covalent bonds between carbon atoms in a chain			
Alkynes	That hydrocarbons contain one or more triple bonds beween carbon atoms in a chain			



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أحيج شحفد الإشلع

تحير شحت الإنعام

ان تحير محدد

Alkenes must have a double bond between carbon atoms there is no 1-تعور محد الإملر carbon alkene

تحير محدد الإمار

Ethene C₂H₄ is the simplest alkene

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hay area lyak

- Alkenes with only one double bond constitute a homologous series
- ✓ The general formula of alkenes C_nH_{2n}
 - Each alkene has 2 fewer hydrogen atoms than acorresponding alkane (why?) because 2e now form the second covalent bond and are no longer a vailable for bonding to hydrogen atoms . تحير شطة الإضار أحير شخت الإعلم

Seet need block

	بورمصد الإشار تحوره	i playi saxa jiy				ing ozer ly
	Name	Ethene	Propene	1-Butene	2-Butene	200.0 p. 6
una Bradg una Bradg	Molecular formula	C ₂ H ₄	C ₃ H ₆	C ₄ H ₈	C ₄ H ₈	stant pari
	Structural formula	H C=C H	H H H	H H H H	H H H	anan pari anan pari anan pari anan pari
	Condensed structural formula	CH ₂ =CH ₂	CH ₃ CH=CH ₂	$CH_3CH_2CH = CH_2$	CH ₃ CH = CHCH ₃	200.0 pari ()

كدور محدد الإتمار

تحير محمد الإصلر

تحير مصد الإمار

تحور محاند الإشار

Naming alkenes :

- ✓ Alkenes are named in much the same way as alkanes
- ✓ Their names are formed by chnging (-ane) ending to (-ene)
- To name alkenes with 4 or more carbons in the chain it is necessary to specify the location of the double bond
- Numbering the carbon in the parent chain, starting at the end of the chain that will give th first carbon in the double bond the lowest number

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See and Blate

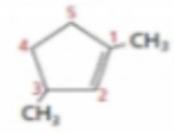
✓ Use only that number in the name

1-Butene

1-2-3-4 2-Butene



a. Straight-chain alkenes



b. Cyclic alkenes

تحير شداند الإشام

Naming cyclic alkenes :

غيرمحد الإمار غيرمحد الإمار

- Are named in much the same way as cyclic alkanes
- Carbon number 1 must be one of the carbons connected by the double bond

Naming branched – chain alkenes :

ing near Bride ing near Bride

- ✓ Same naming of alkanes but with 2 exceptions:
- 1-The parent chain in alkenes is always the longest chain that contain the double bond whether or not it is the longest chain of carbon atoms

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- 2-The position of the double bond not the branches determines how the chain is numbered
- ✓ A number specifies the location of the double bond just as it does in straight –chain alkenes
- Some unsaturated hydrocarbons contain more than one double bond (or triple bond) the number of double we will use a prefix (di, tri, tetra ,and so on) before suffix- ene
- ✓ The positions of the bonds are numbered in a way that give the lowest set of numbers in branched and straight chain branched

2-methylbutene

$$C-C-C=C-C=C-C$$

Of

2,4-heptadiene

a. Single double bond

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أخير شحاد الإشأم

تحوم منصد الإشام

كور محد الإشار

b. Two double bonds

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تعور شحفد اللاعظر

خير مصد الإمار

تحور مصد الإتمار

تحوم شحط الإشام

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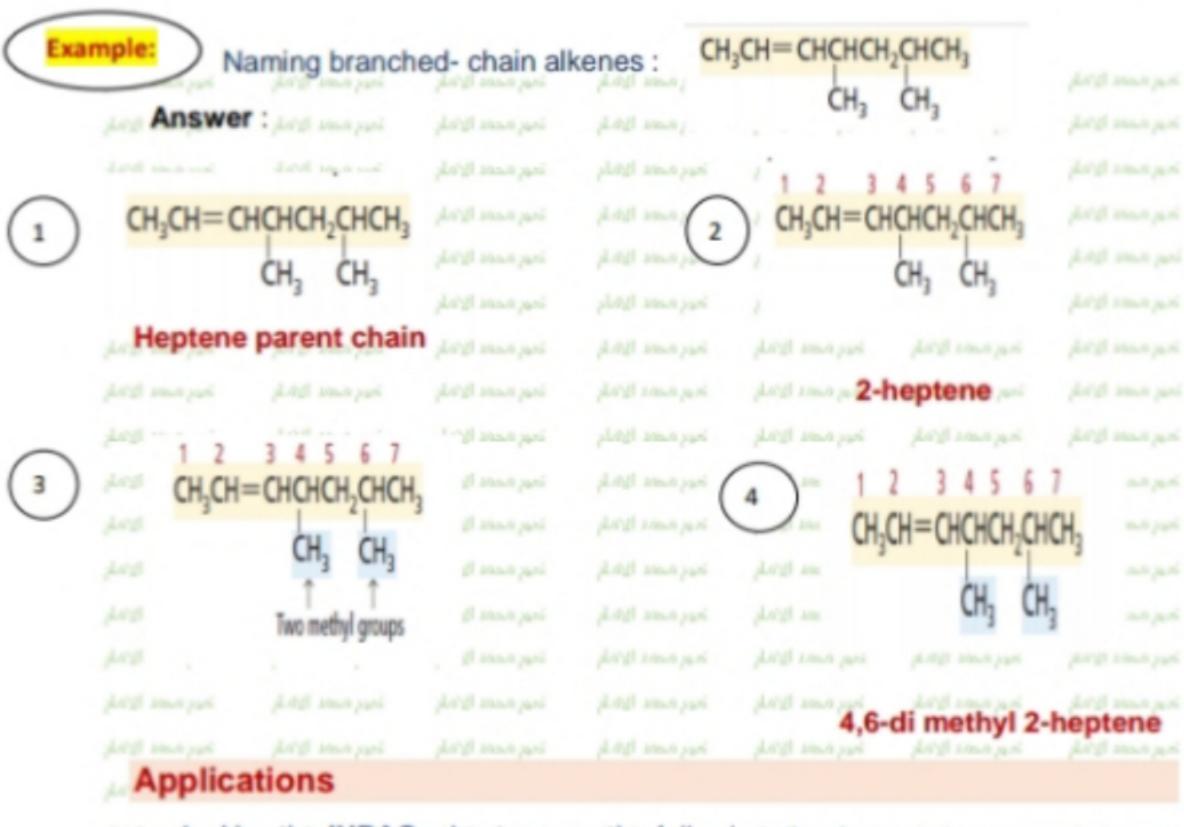
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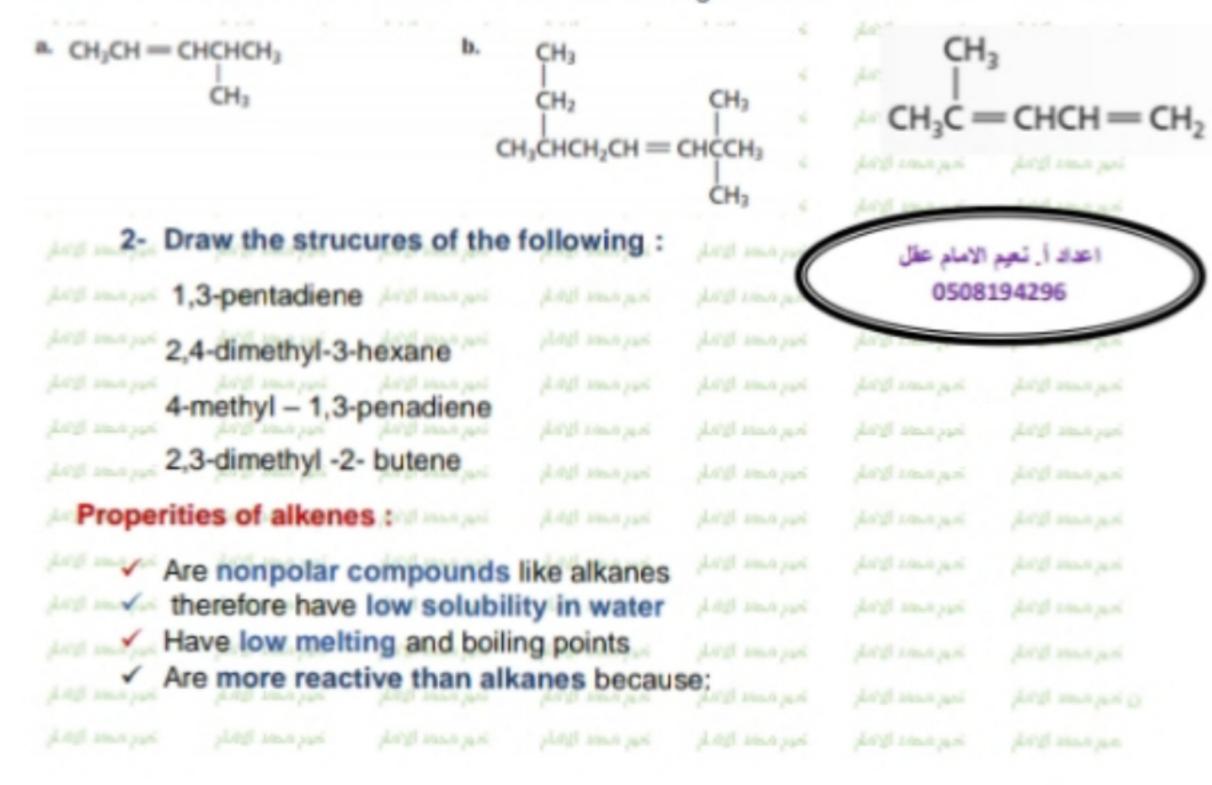
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تحور محت الإشار

تحور محفد الإشار



1- Use the IUPAC rules to name the following structures:



The second covalent bond increases the electron تحور محمد الإصلر تحير منصد الإخلم تحير محدد الإعقر density between two carbon atoms تحور محت الإصلر تحيج محدد الإملج تحوم محمد اللاملم Providing a good site for chemical reactivity Reactants that attract electrones can pull the electrons Sections Right أحوم فنحفد اللافشر away from the double bond تحير محمد الإصلر تعور محمد الإتمار تحير شحفد الإعطر تحوم شحف الإخطر تمهر محمد الإصلر تحور فنصد الإتمار ious, nant lightin تحور محط الإشقر تحير مصد الإصلر مد الإمار اعداد أ. تعيم الامام عقل تجرمحه الإمار > Uses of alkenes : خور محد الإمار 0508194296 V ing nan bolg Several alkenes occur naturally in living organisms أحور محد الإمار تحيج شحفد الإنطر تحيير مبعد الإتمام تحير محد الإملر تصهر شحفد الإصلم Example: ethene C₂H₄ تحير محدد الإملم تحور مصد الإشار تحور محت الإملر تحير مصد الإملر تحور محت الإمار Some of alkenes are responsible for the scents of lemons, limes and تحور محد الإمار pine trees تعور محمد الإشار تعور محد الإمار تعور محد الإمار تحيير شحمد الإثمار تحور شحتد الإنطر Uses of ethene: تعهر محد الإمار تحجر محدد الإعلار تحور محصد الإصلر is a hormone produced naturally by plants It causes fruit to ripen and plays a part in causing ing over Brok ings ment lightly leaves to fall from deciduous trees in preparation for تحور محمد الإعبار أحور شحفة الإنفقر winter تحور محدد الإشار iseq nast light The fruits produce sold in grocery stores ripen artificially when they are exposed to ethene Sept ment lightly تحوم محمد الإمام Is also the starting material for the synthesis of تحور محمد الإصلر تحيير منحد الإمار plastic polyethylene which is used to many products تحور مصد الإصلر تحور محتد الإمار including plastic bags, rope, and milk jugs Neg nam lynk Sections (Note: تحور محمد الإمقر تحور محمد الإصار تحور محصد الإتمار تحور محد الإمقر أحور شخاذ الإشأر لحوم فحفد الإشاء تحور محصا الإتمار تحور محفد الإمار تحير مصد الإمار تحير شحفد الإنطر Alkynes تحيم محمد الإمام تحور محصد الإصار تحور محدد الإملر تحير محمد الإعلر تحجر محمد الإصاير غمير محمد الإنمار ing and land تحير محط الإصلر Unsaturated hydrocarbons That contain one or more triple bonds between carbon atoms and form a homologous series كمرمط الشام تحير محدد الإملر ioug nate lightly تحور شعفد الإشار ✓ General formula : C_nH_{2n-2} أحجر محد الإفلم rest over 18,074 Neg name Wale تحهر محمد الإصغر ✓ The simplest and commonly used alkyne is ethyne C₂H₂ تحور محدد الإنطر common خورشطنا الإملا تحور محت الإتمار name of ethyne is تحور محصا الإتمار acetylene تحور منصد الإصلر تحجر محدد الإصار تحير مصد الإصلا H-C≡C-H تحور منحد الإصلر تحور مصد الإما تحير محتد الإعلم Takl more like تحور منصد الإضار تحير شعفد الإنعلم steep room byody Sealt yang bing عمهر شعفة الإشفر אבק השוב וצוהאן player transport אושן משמג וקימשן icaj nana lijindi تحوم محمد الإشار تحوم شحفد الوقطر تحهر محط الإعلا تحير شطنا الإشار تحيج شحفد الإتملج تعهر شحفد الإصلا ن خير مطد الإمار

عهر محدد الإمام

خير مصد الإمار

تحوم محمد الإشام

تحور محدد الإمام

خور محد الإمام

ואבר משמד וממי אל

تحور محمد الإشار

naming of alkynes :

تحور محط الإشام تحوم شعفد الإتمام تحير محدد الاعلم تحور محمد الإصلر straight - chain alkynes and branched -chain alkynes are named in the تعوم منصد اللاملم تحهر فحفد الإفلم تحيير شحتند الإشلم same way as alkenes

✓ the only difference is that the name of parent chain ends in –yne rather

تحور شحت الإشام

كحور محطد الإشار

تحيج محمد الإملج

كحور شحف الإشائر

than -ene

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Example:

naming of the following:

تحوم محمد الإصام تصرمحه الإعلر تحور محط الإشام

تعهر محط الإصلر

1-pentayne تحور محت الإصلر

تحور مصد الإشار Sections (Role أحوم فنحفد اللافلم تعهر محمد الإملر

تحير محدد الإصلر تحوم محمد الإتمام تحير محدد الإصلر تحير شعفد الإصلر تعير محد الإشار أحيم فنحد الإشام

تحوم فنحف الإضام

تحجر مصد الإملر

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امتعد الإصلر

خور محد الإعلر

تصر مصد الإفار

THE C - CH - CH3 MOVE TOWN IN

CH₃ تحير شحت الإعشر تحيم محمد الإملم تحير محد الاملم

3-methyl – 1- butyne خور مصد الإمار

أخور مصد الإملر

 $CH \equiv CCH_2$

Applications

تمهر محمد الإملار تحيج شحفد الإشلج تحور محمد الإشار تحور محمد الإملار 1- Use the IUPAC rules to name the following structures:

تحور محت الإمار تحيم محمد الإمام تعهر محمد الإصام تحور محمد الإشام تحور محصد الإنمار

iner, ment lightly ing out lyon, تعهر شحط الإضار تعور محد الإمار $CH_3 - C \equiv C - CH_2 - CH_3$

تحوم محمد الإضار Sections Born Sections Block تحهر شحفد الإتمار

July 1000 part تحير محمد الإصغر تعهر محمد الإخطر تحور محد الإشام



1,4-di methyl-2- hexyne

3,4-dimethyl-1-heptayne

تعور محد الإمار تحور محتد الإشار

stay! smayar تحوم محمد الإتمام اعداد أ. نعيم الامام عقل 0508194296

تحور محتد الإعلار

تحيير محدد الإمار

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Mark park

Name	Molecular Formula	Structural Formula	Condensed Structural Formula
Ethyne	C ₂ H ₂	$H-C \equiv C-H$	CH = CH
Propyne	C ₃ H ₄	H-C≡C-C-H	CH ≡ CCH ₃
1-Butyne	C ₄ H ₆	H-C=C-C-C-H	$CH \equiv CCH_2CH_3$
2-Butyne	C ₄ H ₆	H - C = C - C - H H H H	CH₃C ≡ CCH₃

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تحير شحقد الإنطر

تحير شحاد الإشار

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تحير شحدد الإملر

تحير شحمد الإصلر

تعور محمد الإعقر

تحير محدد الإعلر

تحور شحفد الإنطر

تحجر محدد الإعلم

تحيج شحفد الإشام

تحير محمد الإعلم

تحهر شعفد الإنطر

تحهر شحاند الإنطر

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تحجر فحدد الإنطر

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تحير محدد الإعقر

تحجر محدد الإمام

أحير محتد الاعلر

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تحير محدد الإعلم

عهر محدد الاعقر

ان خم محد الامام

Properties of alkynes:

Alkynes have physical and chemical propertiese similar to those of alkenes second Blok

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تحور محفد الإشام

- Alkynes undergo many of the reactions alkenes undergo تعرر محد الإمار
- along town part Are nonpolar compounds
- Not soulble in water V ingg trant light
 - Are generally more reactive than alkenes (why?)



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تحوم محمد الإصلم

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تحور منصد الإشار

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Because thee triple bonds of alkynes have even greater electron density than the double bonds of تحير محد الإملر alkanes

تعور محت الإمار

تحوم منحد الإشام

أحير فبعد الإفلر

تحير محفد الإنعلج

تحور شحد الإتمار

أحور شطنا الإصلر

تحور مصد الإمار

تحور مصد الإملر

تحور محمد الإصار

تحور محمد الإشار

تمهر محمد الإصلح

تحور محمد الإصلر

تحير مصد الإملر

تحير محدد الإصلر

تحور محمد الإصلر

تحير مصد الإمار

تحير منصد الإصلم

تحهر مصد الإملر

أحور محمد الإمام

تحير مصد الإمار

تحير مصد الإملر

saccount play

تحير محمد الإصلر

تحهر شحفد الإصلر

تحير محدد الإصلر

- This cluster of electrons is effective at inducing dipoles in nearby molecules تحير محدد الإصار أحور محدد الإعقر
- Causing them to become unvenly chaarged and thus reactive.

أحيم محتد الإشام

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تعيير محمد الإملر

تعهر محد الإمار

تحور مصد الإملر

تحير محدد الوصار

تحيم منصد الإصلم

تحوم فنحف الإثمام

تحوم فنعفد الإثمام

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تعوم محمد الإنمام

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prepration of ethyne (acetylene):

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تعهر محمد الإملر

- Is a by product of oil refining
 - ✓ is also made in large quantities by the reaction of calcium carbide CaC₂ with water

أحور شحفد الإنطر

تحور محتد الإشأم

تحور محمد الإشام

$$CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$$

Uses of ethyne (acetylene):

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تحوم محمد اللاصلم

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تحور محمد الإصار

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تحوم محمد اللاملم

تحوم محمد الإشار

حير محد الإمار

تحوم شحفة الإراملم

is used as starting materials in the manufacture of plastics and other organic chemical used in industry. تحور محمد الإصار تحور محمد الإملر

تحير محد الإشقر

تحررمه الإمار

تحور محد الإشام

تحيم محمد الإشام

تحور محد الإشار

تحير محد الإمار

تحيم محمد الإشام

- acetylene torches are commonly used in welding?(why)?
- Because ethyne burns with an intensely hot flame that can Reach tempratures as high as 3000 C تحير مصد الإصلر weg men lightly
- The triple bond makes alkynes reactive iver, north lightly

تعهر محمد الإعلا

تعور محمد الإصلر

تعهر محدد الإعلم

تصر محمد الإعطر

تصر شحط الإعطر

تعير محط الإشار

تحور محمد الإصار

اهدى هذا العمل المتواضع الى

وا عادل محمد ابوعبيد

مرمس سائلا المولى عز الوفير ميم محد الامام

تحير محدد الاملم تحير محدد الاملر

تحير محدد الإصلي تحير محدد الإصلر

Section 4: Hydrocarbon Isomers

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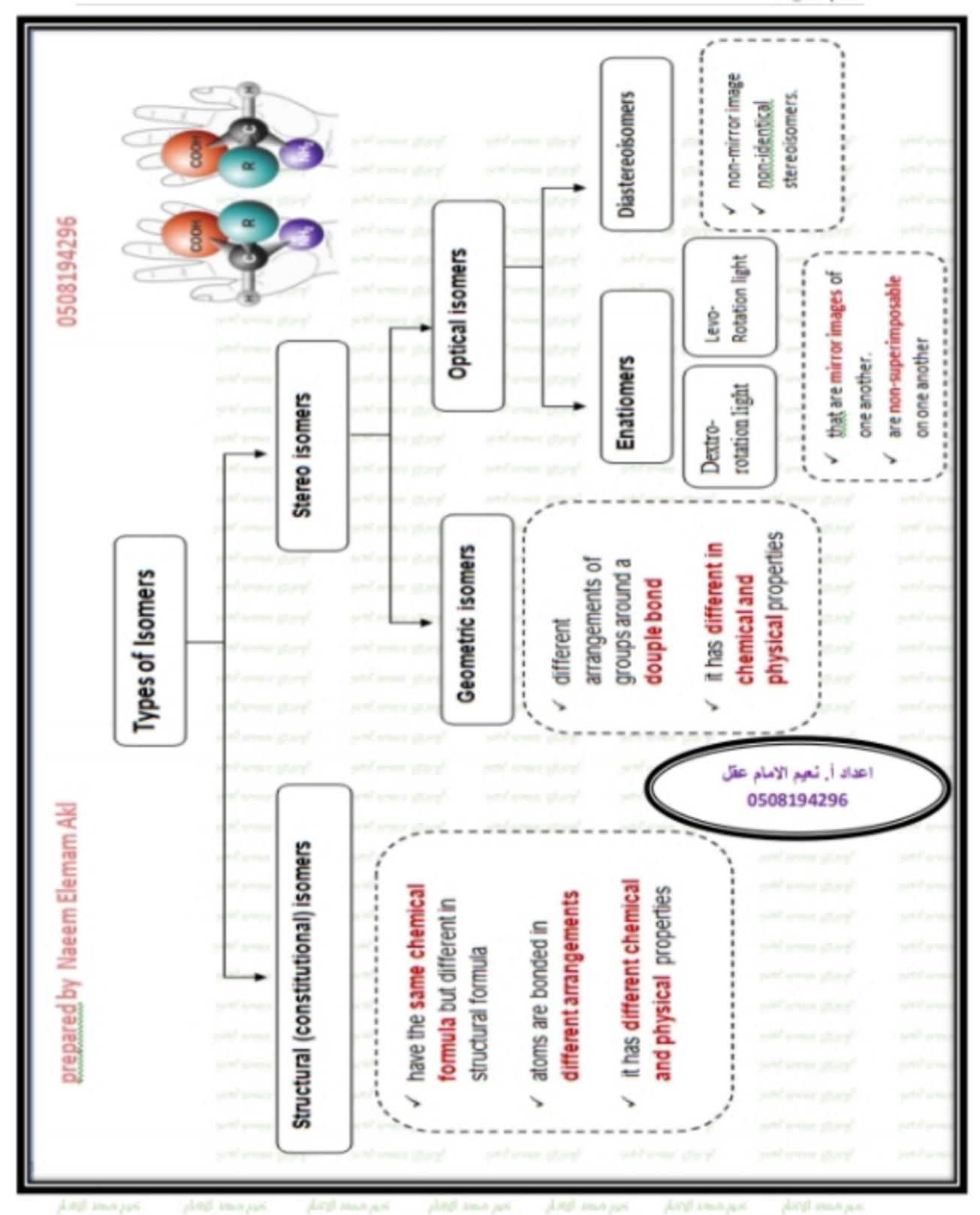
Sections (Note:

Main idea: some hydrocarbons have the same molecular formula but have different molecular structures

Real - world reading link: isomers like twins, identical twins have the same genetic makeup, yet they are two separate individuals with different personalities

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definetion Item Are two or more compounds that have the same molecular Isomers formula but different molecular structuresand its properties Structural isomers Are compounds have the same chemical formula, but their atoms are bonded in different arrangements so it has different chemical and physical properties Stereoisomers Are isomers in which all atoms are bonded in the same order but are arranged differently in space Geometric isomers Are compounds resulting from different arrangements of groups around a douple bond so it has different in chemical and physical properties Chirality That property in which a molecule exist in a right-and left handed form An asymmetric Is a carbon atom that has four different atoms or groups of carbon atoms attached to it Optical isomers That result from different arrangeements of four different groups around the same carbon atom, that have the same chemical and physical properties except in chemical reactions where chirality is important Example :mirror-image isomers Optical rotation An affect That produce when polarized light passes through a solution containing an optical isomer, the plane of polarization is rotated to the right (clock wise, when looking toward the light source) by a D-isomer or to the left (counter-clock wise) by an L-isomer اعداد أ. نعيم الامام عقل تعهر محمد الإشقر to beganned lightly تحور محمد الإشار أموم منصد الإشار 0508194296 ing need lyble, aug ozen liyoli, تحور محمد الإشار تحوم محمد الإشام



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1-Structural isomers :

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- That have the same molecular formula
- but different structure formula
- That are bonded in different arrangement
- Have different chemical and physical properties



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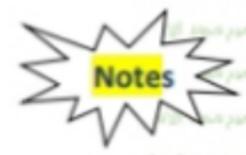
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Joseph Barrier Barrier

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تحير محدد الإعلر



- تحور محدد الإمار The structure of a substance determines its properties
- As the number of carbons in a hydrocarbon increases, the number of تجرمه الإمار تصر محد الإمار log are Wal possible structural isomers increases

Journal Mark

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تحور فنحد الإتعار

تحيم منحد الإضام

تحور محتد الإضار

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تحور محد الإصلر

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Why pentane and cyclopentane are not isomers? تحيج محتد الإملح أحور فحد الإضار Because they are not the same molecular formula cyclopentane's تجرمه الإمار molecular formula C₅H₁₀ and pentan C₅H₁₂

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→ CH₄ , C₂H₆, C₃H₈: not have isomers because it has the only one structure

تحير محمد الإصار

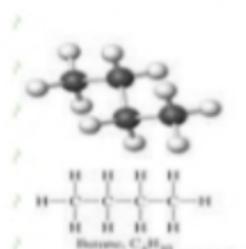
C₄H₁₀: there are 2 isomers

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- ♦ C₅H₁₂: 3 Isomers
- C₆H₁₄:5 isomers
- ◆ C₇H₁₆:9 isomers
 - C₂₀H₄₂:there are more than 300,000 structural isomers.

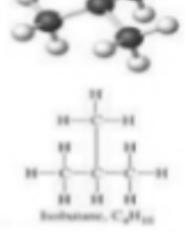
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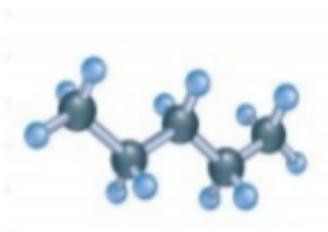
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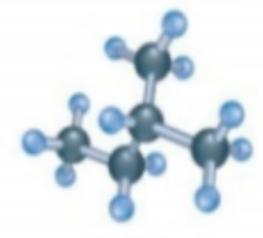
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Pentane bp - 36°C

أموم فبطلا الإكمأم



2-Methylbutane $bp = 28^{\circ}C$

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أحير محمد الإعلم



تحور محمد الإخطر

2,2-Dimethylpropane bp = 9°C

تحير محدد الإنطر

تحور محتد الإتمار

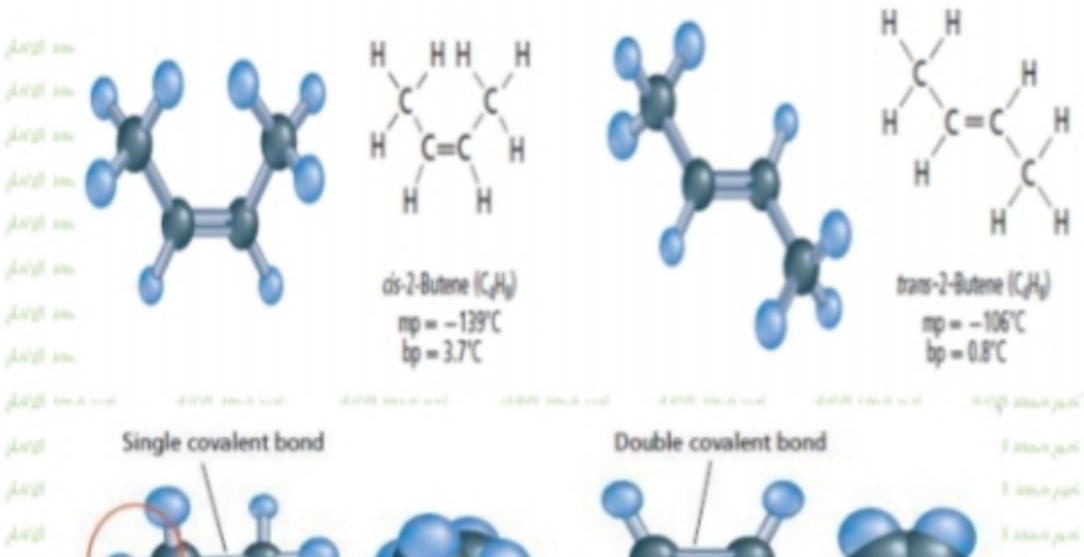
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2-The stereoisomers:

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- Involves a more subtle difference in bonding
- All atoms are bonded in the same order but arranged differently in space

Types of stereoisomers				
Geometric isomers	Optical isomers			
place sena por place sena por place sena por place sena p	ing ours light ing ours light ing ours light			
✓ Occurs in alkene and cyclo alkane ✓ Why geometric isomers not found in alkane? Because the single bond between carbons can rotate freely in relationship to each other, however, when a second covalent bond is present the carbons can no longer rotate they are locked in place	 ✓ Isomers that result from: different arrangements of 4 different groups X,Y,Z,W around the same carbon atom mirorr image to each other and non-superimpossible 			
✓ Geometric isomers divide into :	 Have the same physical and chemical properties except in chemical reactions where chirality is important 			
Cis: two groups on the same side Trans: two groups on opposite side	Examples Logi manyai dang manyai dang manyai Logi manyai dang manyai			
✓ Different in physical properities (such as meiting point and boiling point)	 ✓ : enzyme-catalyzed reaction in biological systems . ✓ Human cells , incorporate only L-amino acids into proteins 			
✓ Differ in some chemical properties (if the compound is biologically active, such as a drug, the cis- and trans- isomers usually have very different effects)	 ✓ Only the L- form of ascorbic acid is active as vitamin C ✓ The chirality of a drug molecule can also important Only one isomer of some drugs molecule is effective and the other isomer 			
✓ Example: And may you play may be a part may	can be harmful			
2-butene Isomers of 2-butene differ in the arrangement in space of the two Methyl groups at the ends. The double -bonded carbon atoms cannot rotate with respect to each other, so the	z-c-x			
methy groups are fixed in one of these two	w w			
arrangements And a	Z-C-Y			
0508194296	These models represent two different			
	molecules, groups Xand Y have switched			
place that may are that may are that may are that	places And man per And man per And man per or			



Carbons free to rotate

Ethane

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Carbons fixed in position: no rotation possible

Ethene

See over 12 out

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Judge sman park

Chiraality:

Role

Broke

Brake

Sept ment Birks

Louis pasteur (1822-1895) discover that crystals of the organic compound tartaric acid, which is a by- product of fermenation of grape juise to make juice to make wine , existed in 2 shapes that were not the same but were mirror images of each other

Seet area Hart

تعور محد الإشام

Handed property:

Lord son yes Person's hands are like mirror images

غمهر شحفد الإخطر

تعير محط الإعلر

Jayl man poe The crystals were called the right -handed and left handed forms (chirality) plant man pari

D-tartaric acid and L-tartaric acid resemble each other in Acquest Blok the same way that your right hand and left hand Sugaret Brak resemble each other

Logi manya The reflection of your right hands looks the same as your left hand July man block

The two forms of tartaric acid had the same chemical plays ama par properities, melting point, density and solubility in water

AND MARKET Only the left-handed form was produced by fermenation

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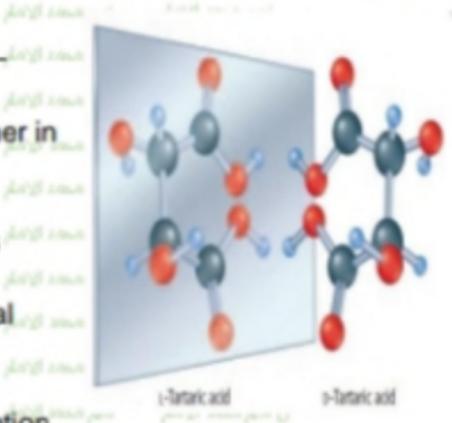


I man pari

I man pari

J. Black park

Jana pari



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تحير شعد الإضار

Sugaran Bark

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Neg neet lynk

- Bacteria were able to multiply when they were fed the left-handed form as a nutrient, but they could not use the right –handed form
- Many of the substances found in living organisms such as the amino acids that make up protiens have this property.
- Many pre-packaged foods are made with trans fats because they have a longer shelf life .eviddence suggests that trans fat increases the unhealthy form of cholestrol and decreases the healthy form, which increases the chance of heart disease

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Optical rotation :

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Sugare Brok

Logi sone pari

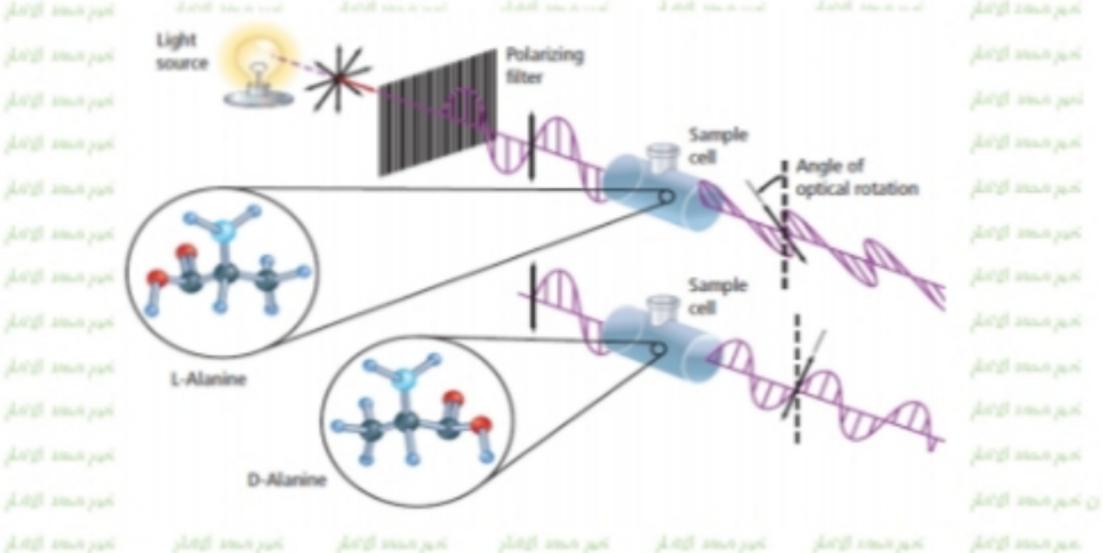
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- Mirror –image isomers are called optical isomers (why?)

 Because they affect light passing throught them
 - Normally the light waves in a beam from the sun or a light bulb move in all possible planes
- Light can be filtered or reflected in such a way that the resulting waves all lie in the same plane (this type of light called polarized light)
 - ✓ When polarized light pass throught a solution containing an optical isomer
 - ✓ Optical rotation effect produce when The plane of polarization is rotated to the right (clockwise, when looking toward the light source) by a D-isomer or to the left(counter clockwise) by an L-isomer , producing .

Example:

- L-menthol is natural isomer has a strong, minty flavor, and cooling odor and taste
- The mirror –image isomer, D-menthol, does not have the same cooling effect as L-menthol



تحير محدد الاملم

تحور شحدد الإصار

تحير محدد الإمار

Section 5: aromatic hydrocarbons

تحور محمد الإشار

Main idea : aromatic hydrocarbons are unusually stable compounds with ring structures in which electrons are shared by many atoms

تعهر محص الإصلر

Real-world reading link: colorful and essential oils for perfums they both contain aromatic hydrocarbons

item	Definetion		
Aromatic	That organic compounds contain benzene rings as part of their structures		
	Aromatic : found in pleasant – smelling oil that come from species , fruits and other plant parts		
compounds	Hydrocarbons such as the alkanes, alkenes and alkynes Aliphatic comes from the greek word for fat which is aleiphatos (obtained it by heating animal fats)		
Delocalized	The electron pairs are shared among all six carbons in the benzene ring		
carcinogens	Are substances that can cause cancer		

The structure of benzene :

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Sections Right

Sections Block

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تحور محمد الإخطر

تحور محصا الإشار

ings, most lightly

Certain hydrocarbons ring structures remained a mystery

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- The simplest example of aromatic compounds is benzene
- Michael faraday first isolated benzene from the gases given off when heated

Sections 1964

See ozer Brok

Suggested by the largest of the larg

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عهر محدد الإملم

- ✓ Although chemists had determined that benzen's molecular formula was C6H6. it was hard for them to determine what sort of hydrocarbone structure would give such a formula
- Chemists reasoned that it must be unsaturated that is, it must have several double or triple bond or combination of both

$$CH_2 = C = CH - CH = C = CH_2$$

chemists suggested structural for benzene but incorrect because of its many double bonds make the compound unstable and extremely reactive

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تحور محدد الإصلح

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أحير محتد الإعلر

تحير شماط الإخطر

ان خم محد الإمار

أخور مصد الإملر

تحور محمد الإصلر

however benzene was fairly unreactive and it did not react in the ways Distant pari that alkenes and alkyne usually react.

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تحور فنعد الإخبار

تحيير شحمد الإتمار

تحور منصد الإشار

Jean David

تحور محمد الإصار

May some Bank

تحهر محدد الإخطر

تحهر محمد الإملر

ing area Well

تحور شطاء الإعلار

تعور شحفد الإصار

تحور محمد الإصار

kekule s dream :

تحوم منطد الإضار

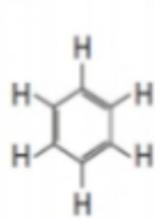
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ing over lyok

 Kekule` claimed that benzene's structure came to him in a dream while he dozed in front of a fireplace in ghent, belguin

تحير محمد الإصلر

- He said that had dreamed of the ourooros (snake)devouring its own tail and that had made him think of ring -shapped structure.
- The flate, hexagonal structure kekule' proposed explained some of the properties of benzene but it did not explain benzene's lack of reactivity تعور محص الإعطر



أحور شحد الإصار تمهر محدد الإمار July Brangari A modern model of benzene :

- Benzene's unreactivity could not be explained until the 1930s
- Linus pauling proposed the theory of hybrid orbitals
- Trill town him 🗸 When applied to benzene, this theory predicts that the pair of electrons that form the second of each of benzene's double bonds are not localized(delocalized) between only two specific carbon atoms as they are in alkenes.
- Delocalization makes the benzene molecule chemically stable because تجور منحد الإضار electrons shared by six carbon nuclei are harder to pull away than electrons held by only two nuclei Jung ama Janua, Just more Block تحور منصد الإخطر
 - Three pairs of electrons form cloud represented by circle in the middle of hexagon.
 - Are numbered in a way that gives the lowest-possible numbers for the stays some pass substituents

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Segrena Igna

Properties of benzene :

plays some paper

chemically stable

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days amayer

تحير محد الإنمار

LASS MARY MAN

- تحور محمد الإصار تحور مصد الإمار Benzene is immiscible in water but soluble in organic solvent خورمحد الإما
- ور محد الإمار It is a colourless liquid and has an aromatic odour. plast son par تحوم فنعط الإشام

تمير محدد الإعار

تمير محمد الإصار

تمهر محمد الإصام

تعهر محط الإفلار

تعهر شدهد الإخطر

تمهر شمط الإخطر

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fre make Benzene shows resonance.

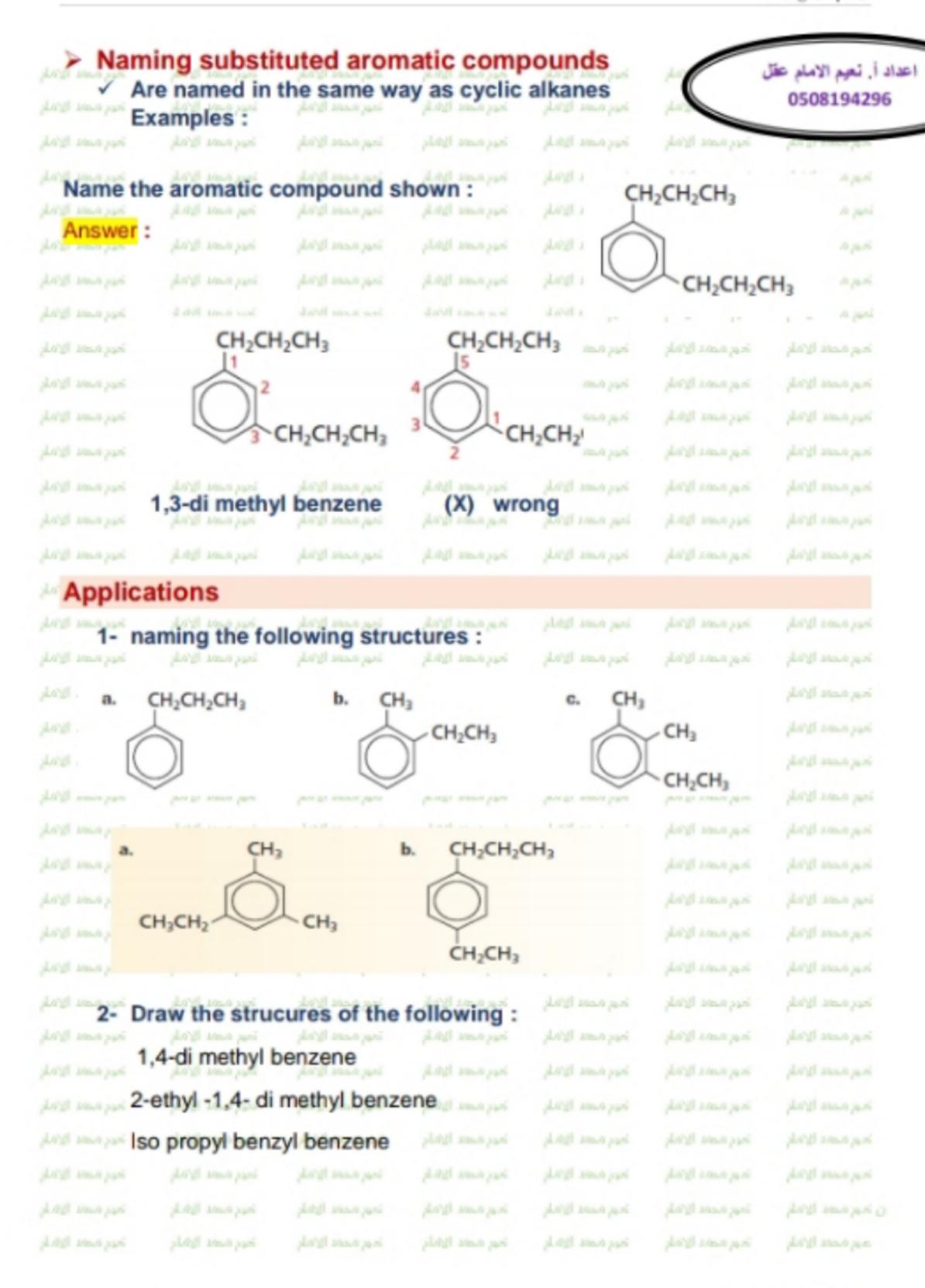
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Hery men Broke

ings near lightly

أحيم محمد الوفائر

It is highly inflammable and burns with a sooty flame. 100 m 100



Cacinogens : تعهر محدد الإمار تحورمها الإشام Sections Rate أخير مصد الإملر أحير محدد الإملر The use Aromatic compounds should be limited because they can affect The first known carcinogen was an aromatic substance discovered a round the turn of the twentieth century in chimny soot because chimney sweeps in great britain were known to have abnomally high rates of cancer تحور منعد الإتعار تحور منعد الإتعار تحير محدد الإصلر Seag near lyak Scientists discovered that the cause of the cancer was the aromatic ing one lyak second block كجر محدد الإمار compound benzopyrene Benzopyrene product by burning of complex mixtures of organic ioux note lynk substances such as wood and coal تحور محدد الإنطر Some aromatic compounds found in gasoline are also known to be carcinogenic تحور محتد الإتمار تحهر محدد الإمار تحير محد الإمار تحيير محمد الإصلر تحررمصد الإشار Sept ment lightly ing over lifety تمير محمد الإعلر تحور محدد الإشام Seer neer Typule تحير محدد الإخلر تحير محدد الإملر Risks of aromatic compounds : تعور محد الإمار اعداد أ. نعيم الامام عقل Respiratory ailments تحير محمد الإعلى فبهر محمد الإصلر 0508194296 Liver problems تمهر محمد الإصلر iver, ment lightly Damage to the nervous system تحور شحفد الإ كحور شحف الإتمار تحور محدد الإتمار تحيجر شحفد الإتمام Cause cancer Segnal Wak تعور محمد الإمار تحجر محدد الإماد تعير مصد الإشار خرر مصد الإمار Sect near lynk, خجر مصد الإما examples of substituted aromatic compounds كحهر شحقة الإتمام تحور محمد الإصلر تحور محد الإشار تعور محد الإملر تعور محد الإملر تعهر محدد الإملر تحير محدد الإملر تحهر محمد الإصلر CH₃ CH₃ CH_3 CH₂CH₃ CH2CH3 Ethylbenzene Methylbenzene CH_3 (toluene) 1,4-Dimethylbenzene 2-Ethyl-1,4-dimethylbenzene (para-xylene) izar, nam liyak Sugare Bak تحور محمد الإصار ings, ment lightly Sections (No.14) تحير محمد الإمام ieug naeu lynk تعهر محدد الإمام تعور محد الامار تعورمهد الإمار تحوم محمد اللاملم تحيم فحمد الإنمار عبهر شحفد الإصار تحير محدد الإعلم تحورهمانا الإعلم تعور محد الامار تمهر محد الإمار تعهم محدد الإنطم تحيم محدد الاملح تحوم محد الإشام تحوم محتد الإصلع און מבמו ועימה تحور محصد الإصار ing and lyok تعهر محمد الإملر تحوم محمد الإملر izag ozen ligolo خورمطد الإشام تمهر محمد الإملم story) sound by out تعهر محدد الإصلر تحور محمد الإشار Sear, more lightly تحور محد الإعار تحوم فنحفد الإتعام تحير محدد الإصار تحور منطد الإنمار ואפון משמד לצימשן تعهر شحفد الإعطر تحير شحد الإنطر تحور منعد الإمام אבק משנו וצמולן عطر محمد الإمار تعور مصد الإصار تحورمحد الإشام تحوم محمد اللامش تصرمحت الإمار تحور محمد الإنمار تحير محدد الإمار تحير محدد الإعلم تحيم منصد الإشار given and the nagona Igolg تحوم منحد الإشار تعهر محمد الإصار تحيم محمد الإصلم تعهر محمد الإصام تعوم مصد الإشار تحوم فنحفد الإفتاح تحهر محدد الإمام way name lightly تحوم محمد الإشام تحير محدد الإصلر عجر محدد الإمام

Structures of some aromatic compounds			
Compound	Structural formula	Uses	
Benzene Angluma pari Angluma pari Angluma pari Angluma pari		Industrial and laboratory solvent	
Toluene (methyl benzene)	CH3 See o part CH3 See o part See o	Industrial and laboratory solvent	
Para-xylene (1,4-Dimethylbenzene)	extrane CH ₃ meren in	Make polyester fibers Make fabrics Industrial and laboratory solvent	
plant smappi plant smappi plant smappi plant smappi plant smappi plant smappi plant smappi plant smappi		Make dyes As a moth repellent	
Anthracene Jord Jane Jane Anthracene Jord Jane Jane Jane Jane Jane Jane Jane Jane	الم المور منعد الوائد	Produce dyes معد الإماد Produce of pigments معر معد الا	
phenanthrene	A CO	Is present in the atmosphere due to the incomplete combustion of hydrocarbons	
benzopyrene	post some pari propri pla	Is a cancer causing chemical that is found in soot, cigarette smoke and	
plays see pari	egi san juni phagi sano juni ph	تمور محد الإصلى المورمحد الإصلى تمورمحد الإصلى المورمحد الإصلى	

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