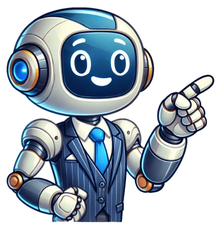
Click Here



ICSE Class 10 students can refer to ICSE Class 10 Organic Chemistry Notes given below which have been prepared as per the latest syllabus and guidelines issued by ICSE Board. All chapter wise revision notes for ICSE Class 10 Chemistry have been prepared by teachers have strong understanding of Chemistry. Read the notes prior to the exams to get better marks in exams Students can refer to the quick revision notes prepared for Chapter Organic Chemistry in Class 10 ICSE. These notes will be really helpful for the students giving the Chemistry exam in ICSE Class 10. Our teachers have prepared these concept notes based on the latest ICSE syllabus and ICSE books issued for the current academic year. Please refer to the detailed notes below Organic Chemistry It is the chemistry of specific carbon compounds except oxides, carbonates and carbides. Hydrocarbons Organic compounds composed of carbon and hydrogen only.Examples: Methane (CH4), ethane (C2H6) Unique Nature of CarbonTetravalency of Carbon Carbon forms four covalent bonds by mutually sharing its four electrons with other atoms. It is hence tetravalent or exhibits tetravalency. Catenation It is the tendency of an element to form chains of identical atoms. Catenation is maximum in carbon because the value of the CC bond energy is maximum. Carbon undergoes self-linking forming straight, branched and closed chains. Catenation and tetravalency also result in the formation of single, double and triple bonds. Classification of Organic Compounds Homologous Series It is a group of organic compounds with a similar structure and similar chemical properties in which thesuccessive compounds differ by a CH2 group. Characteristics of a homologous seriesi. Each member of the series differs from the preceding one by the addition of a CH2 group and by 14amu.ii. All members of a homologous series share a general formula.For example, the general formula for alkane is CnH2n+2 and that for alkene is CnH2n.iii. The physical properties of the members show gradation in properties as molecular mass increases.iv. The chemical properties also show gradient similarity.For example, methane and ethane react with chlorine to form methyl chloride and ethyl chloride,respectively.CH4 + Cl2 CH3ClC2H6 + Cl2 C2H5Clv. All members of a homologous series can be prepared by the same general method of preparation.For example, alcohols can be prepared from alkyl halides. Significance of a Homologous Seriesi. Helps in the systematic study of organic compounds.ii. Predicts the properties and the nature of other elements of the series if the same is known of the firstfew members. Isomers Compounds with the same molecular formula but different structural formula are known as isomers, andthe phenomenon is known as isomerism.Examples: Butane and isobutane are two different compounds with the same molecular formula C4H10. Causes of Isomerismi. Difference in the mode of linking of atoms.ii. Difference in the arrangement of atoms or groups in space. Different Types of Structural Isomerismi. Chain isomerismTwo or more compounds which have a similar molecular formula but different arrangement ofcarbon atoms in straight or branched chains are referred to as chain isomers, and thephenomenon is known as chain isomerism. ii. Position isomerismWhen two or more compounds with the same molecular formula differ in the position of thesubstituent atom or functional group on the carbon atom, they are called position isomers, and thephenomenon is known as position isomerism. iii. Functional isomerismTwo or more compounds with the same molecular formula but different functional groups are calledfunctional isomers, and the phenomenon is known as functional isomerism. iv. MetamerismIt arises because of unequal distribution of alkyl groups on either side of the functional groups inthe molecules. Nomenclature It is the system of assigning names to organic compounds. The Systems of Nomenclature Arei. Trivial systemii. IUPAC (International Union of Pure and Applied Chemistry) system According to the IUPAC system, the name of an organic compound consists of three parts:i. Root wordii. Suffixiii. Prefix i. Root wordIt depends on the number of carbon atoms present in the longest carbon chain selected. ii. SuffixThe root word is followed by an appropriate suffix, which represents the nature of the bond in acarboncarbon atom. iii. PrefixIt denotes the substituent, alkyl or functional group and its position in the carbon chain.Di-, tri- and tetra- are used for two, three and four groups of the same type, respectively. Functional Group It is an atom or a group of atoms which defines the structure (or the properties of a particular family) oforganic compounds. Characteristics of a Functional Groupi. Compounds of the same functional group are identified using the same types of tests.ii. The physical and chemical properties of the compounds of different functional groups are different.iii. There exists a homologous series of compounds containing a particular type of functional group. Alkanes Alkanes are hydrocarbons in which all the linkages between the carbon atoms are single covalentbonds. Compounds are known as saturated hydrocarbons because all the four valencies of carbon are fullysatisfied. General formula : CnH2n+2 These hydrocarbons are relatively unreactive under ordinary conditions so they are also calledparaffins. Isomerism in Alkanes Alkanes with more than three carbon atoms form isomers. The various isomers differ in the framework of the carbon chains.Example:Isomers of Pentane (C5H12) Methods of Preparation of Methane and Ethane 1. From iodomethane or bromoethane:CH3I + 2[H] CH4 + HIC2H5I + 2[H] C2H6 + HI 2. Methane is produced on addition of water to aluminium carbide at room temperature.Al4C3 + 12H2O 3CH4 + 4Al (OH)3 (ii) Reaction with oxygenCH4 + 2O2 CO2 + 2H2O2C2H6 + 7O2 4CO2 + 6H2OInsufficient supply of air2CH4 + 3O2 2CO + 4H2O2C2H6 + 5O2 4CO + 6H2O Alkenes Alkenes are unsaturated aliphatic hydrocarbons containing a carboncarbon double bond. They are also called olefins because of their tendency to form oily products. The general formula of alkenes is CnH2n. Two carbon atoms linked by a double covalent bond. A double covalent bond is formed by sharing of two pairs of electrons between the two carbon atoms. Four CH single covalent bonds and one C=C double covalent bond. It is a planar molecule and all bond angles (HCH and HC=C) are of 120. Preparation of Ethenei. Dehydration of ethyl alcohol Chemical properties1. Addition Reactions(i) Catalytic hydrogenation Alkynes Alkynes are unsaturated aliphatic hydrocarbons containing a carboncarbon triple bond in theirmolecule. The general formula of alkynes is CnH2n2. They are more reactive than alkenes because of the presence of a triple bond, often referred to as anacetylenic linkage. Chemical Properties1. Addition Reactions Alcohols Alcohols are hydroxyl derivatives of alkanes obtained by replacement of one, two or three hydrogenatoms of alkanes by the corresponding number of OH groups. The hydroxyl group is the functional group of alcohols. The general molecular formula of alcohols is CnH2n+1 OH. Preparation of Ethanol(i) Laboratory preparation by hydrolysis of alkyl halides Carboxylic Acids Carboxylic acids are organic compounds containing a carboxylic group (COOH) attached to an alkylgroup or to a hydrogen atom. Representation of carboxylic acids: R-COOH (R is either H or alkyl) The functional group of carboxylic acids: COOH (carboxylic) The acidic character in carboxylic acids is because of the presence of the replaceable hydrogen atomin the carboxylic group. Preparation of Acetic AcidA] By oxidation of ethyl alcohol Chemical Properties 1. It is a weak acid and turns blue litmus red.2. Reaction with AlkalisCH3COOH + NaOH CH3COONa + H2OCH3COOH + NH4OH CH3COONH4 + H2O3. Reaction with Carbonates2CH3COOH + Na2CO3 2CH3COONa + H2O + CO2CH3COOH + NaHCO3 CH3COONa + H2O + CO24. Reaction with Alcohols 5. Reaction with PCl3CH3COOH + PCl5 CH3COCl + POCl3 + HCl6. ReductionCH3COOH + 4[H] C2H5OH + H2O Organic chemistry is more than simply the study of carbon or the study of chemicals in living organisms. Organic chemistry is everywhere. Organic chemistry is the study of carbon and the study of the chemistry of life. Since not all carbon reactions are organic, another way to look at organic chemistry would be to consider it the study of molecules containing the carbon-hydrogen (C-H) bond and their reactions. Organic chemistry is important because it is the study of life and all of the chemical reactions related to life. Several careers apply an understanding of organic chemistry, such as doctors, veterinarians, dentists, pharmacologists, chemical engineers, and chemists. Organic chemistry plays a part in the development of common household chemicals, foods, plastics, drugs, and fuels most of the chemicals part of daily life. An organic chemist is a chemist with a college degree in chemistry. Typically this would be a doctorate or master's degree in organic chemistry, though a bachelor's degree in chemistry may be sufficient for some entry-level positions. Organic chemists usually conduct research and development in a laboratory setting. Projects that would use organic chemists would include the development of a better painkilling drug, formulating a shampoo that would result in silkier hair, making a stain resistant carpet, or finding a non-toxic insect repellent.,the free encyclopedia that anyone can edit.117,185 active editors 7,001,880 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.Members of the victorious Blondie crewThe Boat Race 2018 took place on 24March. Held annually, The Boat Race is a side-by-side rowing race between crews from the universities of Oxford and Cambridge along a 4.2-mile (6.8km) tidal stretch of the River Thames in south-west London, England. For the third time in the history of the event, the men's, the women's and both reserves' races were all held on the Tideway on the same day. The women's race saw Cambridge lead from the start, eventually winning by a considerable margin to take the overall record to 4330 in their favour. In the women's reserve race, Cambridge's Blondie (crew pictured) defeated Oxford's Osiris by nine lengths. The men's reserve race was won by Cambridge's Goldie, who defeated Oxford's Isis by a margin of four lengths. The men's race was the final event of the day and completed a whitewash as Cambridge won, taking the overall record to 8380 in their favour. The races were watched by around 250,000 spectators live, and broadcast around the world. (Fullarticle...)Recently featured: Radar, Gun Laying, Mk.I and Mk.IIAndrea NavageroNosy KombaArchiveBy emailMore featured articlesAboutKitty Marion... that Kitty Marion (pictured) was force-fed over 200 times during a hunger strike?... that the North Korean destroyer Choe Hyon is the largest ship constructed for the Korean People's Navy?... that after the release of High and Low, director Akira Kurosawa received telephone calls imitating his film that threatened to kidnap his daughter?... that May Bradford Shockley is why Silicon Valley is where it is?... that the conservation of a goat might endanger the survival of Aquilegia paui?... that Joy Laking predicted in a school writing assignment that within ten years she would be making a living as an artist?... that the Taiwanese restaurant chain Formosa Chang drew inspiration from McDonald's for its non-greasy atmosphere and corporate practices?... that Haridas Mitra had his death sentence commuted after the intervention of Mahatma Gandhi?... that "Steve's Lava Chicken" recently became the shortest song to enter the UK Top 40?ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.In basketball, the EuroLeague concludes with Fenerbahe winning the Final Four Playoff.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Harrison Ruffin TylerPhil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollyNominate an articleMay 31: Dragon Boat Festival in China and Taiwan (2025); World No Tobacco DayBessarion455 Petronius Maximus, the ruler of the Western Roman Empire, was stoned to death by a mob as he fled Rome ahead of the arrival of a Vandal force that sacked the city.1223 Mongol invasion of Kievan Rus': Mongol forces defeated a Kievan Rus' army at the Battle of the Kalka River in present-day Ukraine.1468 Cardinal Bessarion (pictured) announced his donation of 746 Greek and Latin codices to the Republic of Venice, forming the Biblioteca Marciana.1935 A magnitude-7.7 earthquake struck Balochistan in British India, now part of Pakistan, killing between 30,000 and 60,000 people.2013 An extremely large, powerful, and erratic tornado struck Central Oklahoma, killing eight people and injuring more than 150 others.Albertino Mussato (d.1329)Joseph Grimaldi (d.1837)Dina Boluarte (b.1962)Mbaye Diagne (d.1994)More anniversaries: May 30May 31June 1ArchiveBy emailList of days of the yearAboutCucumis metuliferus, the African horned cucumber, is an annual vine in the cucumber and melon family, Cucurbitaceae. Its fruit has horn-like spines, hence the name "horned melon". The ripe fruit has orange skin and lime-green, jelly-like flesh. It is native to Southern Africa, where it is a traditional food. Along with the gemsbok cucumber and the citron melon, it is one of the few sources of water during the dry season in the Kalahari Desert. This photograph, which was focus-stacked from 25 separate images, shows two C.metuliferus fruits, one whole and the other in cross-section.Photograph credit: Ivar LeidusRecently featured: Ignace TonenAustralian white ibisHell Gate BridgeArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2This article is about the year 455. For other uses, see 455 (disambiguation).This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"455"news newspapers books scholar JSTOR (April 2019) (Learn how and when to remove this message)Calendar yearYearsMillennium1stmillenniumCenturies4thcentury5thcentury 6thcenturyDecades430s440s450s 460s470sYears452453454455 456457458vte455 by topicLeadersPolitical entitiesState leadersReligious leadersCategoriesBirthsDeathsDisestablishmentsvte455 in various calendarsGregorian calendar455CDLVAb urbe condita1208Assyrian calendar5205Balinese saka calendar376377Bengali calendar139 138Berber calendar1405Buddhist calendar999Burmese calendar183Byzantine calendar59635964Chinese calendar (WoodHorse)3152 or 2945to (WoodGoat)3153 or 2946Coptic calendar171172Discordian calendar1621Ethiopian calendar447448Hebrew calendar42154216Hindu calendars- Vikram Samvat511512- Shaka Samvat376377- Kali Yuga35553556Holocene calendar10455Iranian calendar167 BP 166 BPIslamic calendar172 BH 171 BHJavanese calendar340341Julian calendar455CDLVKorean calendar2788Minguo calendar1457 before ROC1457Nanakshahi calendar1013Seleucid era766/767 AGThai solar calendar997998Tibetan calendar(male Wood-Horse)581 or 200 or 572to(female Wood-Goat)582 or 201 or 571King Genseric sacks Rome (455)Year 455 (CDLV) was a common year starting on Saturday of the Julian calendar. At the time, it was known as the Year of the Consulship of Valentinianus and Anthemius (or, less frequently, year 1208 Ab urbe condita). The denomination 455 for this year has been used since the early medieval period, when the Anno Domini calendar era became the prevalent method in Europe for naming years.March 16 Emperor Valentinian III, age 35, is assassinated by two Hunnic retainers of the late Flavius Aetius, while training with the bow on the Campus Martius (Rome), ending the Theodosian dynasty. His primicerius sacri cubiculi, Heraclius, is also murdered.March 17 Petronius Maximus, former domesticus ("elite bodyguard") of Aetius, becomes (with support of the Roman Senate) emperor of the Western Roman Empire. He secures the throne by bribing officials of the imperial palace. Maximus consolidates his power by a forced marriage with Licinia Eudoxia, widow of Valentinian III.Maximus appoints Avitus, most trusted general, to the rank of magister militum and sends him on an embassy to Toulouse, to gain the support of the Visigoths. He elevates his son Palladius to Caesar and has him marry Eudocia, eldest daughter of Valentinian III.May 31 Maximus is stoned to death by an angry mob while fleeing Rome. A widespread panic occurs when many citizens hear the news that the Vandals are plundering the Italian mainland.June 2 Sack of Rome: King Genseric leads the Vandals into Rome, after he has promised Pope Leo I not to burn and plunder the city. Genseric sacks the city for a period of two weeks. Eudoxia and her daughters, Eudocia and Placidia, are taken hostage. The loot is sent to the harbour of Ostia and loaded into ships, from whence the Vandals depart and return to Carthage.July 9 Avitus is proclaimed Roman emperor at Toulouse, and later recognised by the Gallic chiefs in Viernum (near Arles).September 21 Avitus enters Rome with a Gallic army. He restores the imperial authority in Noricum (modern Austria) and leaves a Gothic force under Remistus, Visigoth general (magister militum), at Ravenna.The Ostrogoths conquer Pannonia and Dalmatia.Battle of Aylesford: Prince Vortimer rebels against the pro-Anglo-Saxon policies of his father, Vortigern. He is defeated in the battle at Aylesford (Kent). Hengist and his son Oisc become king of Kent. Horsa and Catigern, brother of Vortimer, are killed. The Britons withdraw to London (according to the Anglo-Saxon Chronicle).Skandagupta succeeds Kumaragupta I as ruler of the Gupta Empire (India). During his reign he crushes the Hun invasion; however, the expense of the wars drains the empire's resources and contributes to its decline.Gaero becomes king of the Korean kingdom of Baekje.[1]Earliest recorded date at Chichen Itza on the Yucatn Peninsula (Mexico) (approximate date).Barter economy replaces organized trade as Romans and other citizens desert their towns for the countryside, where they will be less vulnerable to barbarian raids (approximate date).The city of Vindobona (Vienna) is struck by an epidemic that spreads through the Roman provinces. The disease is probably streptococcus or a form of scarlet fever with streptococcus pneumoniae (approximate date).Rusticus, archbishop of Lyon (approximate date)Wang Baoming, empress of the Southern Qi (d. 512)March 16Valentinian III, emperor of the Western Roman Empire (b. 419)Heraclius, Roman courtier (primicerius sacri cubiculi)May 31 Petronius Maximus, emperor of the Western Roman EmpireBiyu of Baekje, king of Baekje[1]Catigern, prince and son of Vortigern (approximate date)Horsa, leader of the Anglo-Saxons (approximate date)Kumaragupta I, ruler of the Gupta Empire (India)Niall Noigiallach, High King of Ireland (approximate date)Palladius, son of Petronius Maximus (approximate date)Prosper of Aquitaine, disciple and Christian writer (approximate date)^ a b "List of Rulers of Korea". www.metmuseum.org. Retrieved April 20, 2019.Retrieved from " 3One hundred years, from 301 to 400Millennia1stmillenniumCenturies3rdcentury4thcentury5thcenturyTimelines3rdcentury4thcentury5thcenturyState leaders3rdcentury4thcentury5thcenturyDecades300s310s320s330s340s350s360s370s380s390sCategories:Births Deaths Establishments DisestablishmentsvteEastern Hemisphere at the beginning of the 4th century CE.Eastern Hemisphere at the end of the 4th century CE.The 4th century was the time period from 301 CE (represented by the Roman numerals CCCI) to 400 CE (CD) in accordance with the Julian calendar. In the West, the early part of the century was shaped by Constantine the Great, who became the first Roman emperor to adopt Christianity. Gaining sole reign of the empire, he is also noted for re-establishing a single imperial capital, choosing the site of ancient Byzantium in 330 (over the current capitals, which had effectively been changed by Diocletian's reforms to Milan in the West, and Nicomedeia in the East) to build the city soon called Nova Roma (New Rome); it was later renamed Constantinople in his honor.The last emperor to control both the eastern and western halves of the empire was Theodosius I. As the century progressed after his death, it became increasingly apparent that the empire had changed in many ways since the time of Augustus. The two-emperor system originally established by Diocletian in the previous century fell into regular practice, and the east continued to grow in importance as a centre of trade and imperial power, while Rome itself diminished greatly in importance due to its location far from potential trouble spots, like Central Europe and the East. Late in the century Christianity became the official state religion, and the empire's old pagan culture began to disappear.[citation needed] General prosperity was felt throughout this period, but recurring invasions by Germanic tribes plagued the empire from 376[1][2] CE onward. These early invasions marked the beginning of the end for the Western Roman Empire.In China, the Jin dynasty, which had united the nation prior in 280, began rapidly facing trouble by the start of the century due to political infighting, which led to the insurrections of the northern barbarian tribes (starting the Sixteen Kingdoms period), which quickly overwhelmed the empire, forcing the Jin court to retreat and entrench itself in the south past the Yangtze river, starting what is known as the Eastern Jin dynasty around 317. Towards the end of the century, Emperor of the Former Qin, Fu Jin, united the north under his banner, and planned to conquer the Jin dynasty in the south, so as to finally reunite the land, but was decisively defeated at the Battle of Fei River in 383, causing massive unrest and civil war in his empire, thereby leading to the fall of the Former Qin, and the continued existence of the Eastern Jin dynasty.According to archaeologists, sufficient archaeological evidence correlates of state-level societies coalesced in the 4th century to show the existence in Korea of the Three Kingdoms (300/400668 CE) of Baekje, Goguryeo, and Silla.Historians of the Roman Empire refer to the "Long Fourth Century" to the period spanning the fourth century proper but starting earlier with the accession of the Emperor Diocletian in 284 and ending later with the death of Honorius in 423 or of Theodosius II in 450.[3]See also: Christianity in the 4th centuryGregory the Illuminator mosaic, converted Armenia from Zoroastrianism to ChristianityContemporary bronze head of Constantine I (r. 306337 AD)Early 4th century Former audience hall now known as the Basilica, Trier, Germany, is built.Early 4th century The Gupta Empire is established.301: Armenia first to adopt Christianity as state religion.304439: The Sixteen Kingdoms in China begins.306337: Constantine the Great, ends persecution of Christians in the Roman Empire (see also Constantinian shift) and Constantinople becomes new seat of government (New Rome).Tikal had a population of about 100,000 when it was conquered by Teotihuacan, less than a fourth of its peak population[4]320: Butuan Boat One, the oldest known Balangay, a multi-purpose ship native to the Philippines is built.325328: The Kingdom of Aksum adopts Christianity.325: Constantine the Great calls the First Council of Nicaea to pacify Christianity in the grip of the Arian controversy.335380: Samudragupta expands the Gupta Empire.337: Constantine the Great is baptized a Christian on his death bed.350: About this time the Kingdom of Aksum conquers the Kingdom of Kush.350400: At some time during this period, the Huns began to attack the Sassanid Empire.[2]350: The Kutai Martadipura kingdom in eastern Borneo produced the earliest known stone inscriptions in Indonesia known as the Mulavarman inscription written in the Sanskrit language using Pallava scripture.[5]Mid-4th century Dish, from Mildenhall, England, is made. It is now kept at the British Museum, London.Mid-4th century Wang Xizhi makes a portion of a letter from the Feng Ju album. Six Dynasties period. It is now kept at National Palace Museum, Taipei, Taiwan, Republic of China.365: An earthquake with a magnitude of at least eight strikes the Eastern Mediterranean. The following tsunami causes widespread destruction in Crete, Greece, Libya, Egypt, Cyprus, and Sicily.376: Visigoths appear on the Danube and are allowed entry into the Roman Empire in their flight from the Huns.378: Battle of Adrianople: Roman army is defeated by the Visigoth cavalry. Emperor Valens is killed.378395: Theodosius I, Roman emperor, bans pagan worship, Christianity is made the official religion of the Empire.378: Siyaj K'ak' conquers Waka on (January 8), Tikal (January 16) and Uaxactun.Wall painting of the Council of Constantinople (381) in the Stavropoleos monastery, Romania381: First Council of Constantinople reaffirms the Christian doctrine of the Trinity by adding to the creed of Nicaea.383: Battle of Fei River in China.395: The Battle of Canhe Slope occurs.395: Roman emperor Theodosius I dies, causing the Roman Empire to split permanently.Late 4th century: Cubiculum of Leonis, Catacomb of Commodilla, near Rome, is made.Late 4th century: Atrium added in the Old St. Peter's Basilica, Rome.For a more comprehensive list, see Timeline of historic inventions 4th century.The Stirrup was invented in China, no later than 322.[6][1]Kama Sutra, dated between c.400 BC to c. 300 AD.[7][8]Iron pillar of Delhi, India is the world's first Iron Pillar.[citation needed]Trigonometric functions: The trigonometric functions sine and versine originated in Indian astronomy.[9]Codex Sinaiticus and the Codex Vaticanus Graecus 1209, are the earliest Christian bibles.[10][11]Book of Steps, Syriac religious discourses.[citation needed]^ a b "The invention and influences of stirrup". Archived from the original on December 3, 2008.^ a b Roberts, J: "History of the World". Penguin, 1994.^ The Long Fourth Century 284450: Continuity and Change in the Later Roman Empire ed. S. McGill, C. Sogno and E. Watts (Cambridge 2008).^ "The Maya: Glory and Ruin". National Geographic Magazine. Archived from the original on April 9, 2008.^ "The Austronesians: Historical and Comparative Perspectives". ANU Press. Archived from the original on 2013-12-25. Retrieved 2013-04-29.^ Lee, Adela C.Y. "The stirrup and its effect on chinese military history". Silkroad Foundation.^ Sengupta, J. (2006). Refractions of Desire, Feminist Perspectives in the Novels of Toni Morrison, Michle Roberts, and Anita Desai. Atlantic Publishers & Distributors. p.21. ISBN978-81-269-0629-1. Archived from the original on 4 May 2016. Retrieved 7 December 2014.^ Kakar, Sudhir; Doniger, Wendy (2003). Kamasutra. Oxford; Toronto: Oxford University Press. pp.xi. ISBN978-0-19-283982-4.^ Bag, A.K. (1979). Mathematics In Ancient and Medieval India. Delhi: Chaukhambha Orientalia. p.15.^ Aland, Kurt; Aland, Barbara (1995). The Text of the New Testament: An Introduction to the Critical Editions and to the Theory and Practice of Modern Textual Criticism. Erroll F. Rhodes (trans.). Grand Rapids, Michigan: William B. Eerdmans Publishing Company. p.109. ISBN978-0-8028-4098-1.^ "Liste Handschriften". Mnster: Institute for New Testament Textual Research. Retrieved 16 March 2013.Retrieved from " 4The following pages link to 4th century External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)List of decades, centuries, and millennia (links | edit)Religion in pre-Islamic Arabia (links | edit)Rosetta Stone (links | edit)20th century (links | edit)15th century (links | edit)16th century (links | edit)17th century (links | edit)18th century (links | edit)14th century (links | edit)1st century (links | edit)13th century (links | edit)397 (links | edit)12th century (links | edit)11th century (links | edit)7th century (links | edit)10th century (links | edit)9th century (links | edit)8th century (links | edit)6th century (links | edit)5th century (links | edit)3rd century (links | edit)2nd century (links | edit)405 (links | edit)4th century BC (links | edit)432 (links | edit)200s (decade) (links | edit)300s (decade) (links | edit)1st century BC (links | edit)2nd century BC (links | edit)3rd century BC (links | edit)5th century BC (links | edit)6th century BC (links | edit)400s (decade) (links | edit)310s (links | edit)320s (links | edit)321 (links | edit)21st century BC (links | edit)11th century BC (links | edit)286 (links | edit)476 (links | edit)385 (links | edit)7th century BC (links | edit)410 (links | edit)325 (links | edit)380s (links | edit)381 (links | edit)470s (links | edit)430s (links | edit)430 (links | edit)510s (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/4th_century" Chapter NameOrganic ChemistryTopics CoveredCharacteristic Features of -BondsFunctional GroupOrganic compounds and Homologous CompoundsIUPAC Nomenclature of Carbon CompoundsCarboxylic acidPreparation and Properties of AlkanesIsomerisationSubstitution ReactionsPreparation and Properties of AlkenesMarkovnikov's RuleAlkynesEthyne: Properties, Uses and PreparationPolymerisationEthanol: Properties, Uses and PreparationAcetic Acid: Properties, Uses and PreparationRelated StudyOrganic compounds are vital for sustaining life on earth and include complex molecules such as the genetic information-bearing deoxyribonucleic acid (DNA) and proteins that constitute essential components of our blood, skin, and muscles. Organic chemicals are used to synthesise materials such as clothing, fuels, polymers, dyes, and medicines.Around the year 1780, scientists began to distinguish organic compounds obtained from plants and animals and inorganic compounds prepared from mineral sources. A Swedish chemist, Berzelius, proposed that a vital force was responsible for the formation of organic compounds. However, this notion was rejected in 1828 when F.Wohler synthesised an organic compound (urea) from an inorganic compound (ammonium cyanate). The pioneering synthesis of acetic acid by Kolbe (1845) and that of methane by Berthelot (1856) showed conclusively that organic compounds could be synthesised from inorganic sources in the laboratory.As we know that carbon has a unique tendency of catenation, it binds with itself via a series of covalent bonds. This is the basis of organic chemistry.The number of carbon compounds is so vast that there is one branch of chemistry dedicated only to the study of carbon and its compounds. This branch is known as organic chemistry.Organic chemistry is a discipline within chemistry, which involves scientific study of structure, properties, composition, reactions, and synthesis of compounds containing carbon. These compounds can also contain nitrogen, sulphur, and halogens. The source of these organic compounds is widely spread in nature.Sources of some of the important organic compounds are given in the table below:SourceOrganic Compound Obtained From SourcePlantsSugar, starch, cellulose, drugsAnimalsUrea, proteins, fatsCoalBenzene, toluene, naphthalene, dyes, drugs, perfumesPetroleumGasoline, fuel gases, petrol, naphthaFermentationEthyl alcohol, acetic acidWoodMethyl alcohol, acetoneHow carbon binds with itself ?Carbon is a major part of all living things. In the air, it is present as carbon dioxide and comprises around 0.03% of the total atmosphere.Carbon exhibits two important properties:Carbon can combine with other atoms of carbon to form long chains and rings. These chains and rings are not only long but also very stable. This is because carbon can form strong single, double, and triple bonds with other atoms of carbon.Carbon is a non-metal having the symbol 'C' and atomic number six. Since the atomic number of carbon is six, its electronic configuration is 2, 4. This means that carbon contains two electrons in K-shell and 4 electrons in L-shell (outermost shell). Hence, it has four electrons in its valence shell.Since carbon has four electrons in its valence shell, it requires four more electrons to complete its octet. Therefore, it is a tetravalent element.In order to complete its octet i.e., to attain the noble gas configuration and to stabilise itself, carbon can:Either lose four electrons to form C4+ or gain four electrons to form C4-. This, however, requires a lot of energy and would make the system unstable.Therefore, carbon completes its octet by sharing its four electrons with the other carbon atoms or with atoms of other elements.The bonds that are formed by sharing electrons are known as covalent bonds. Covalently bonded molecules have strong intermolecular forces, but intramolecular forces are weak.Carbon has four valence electrons and requires four more electrons to complete its octet. Therefore, it is capable of bonding with four other atoms of carbon or atoms of other elements having a valency of 1.For example, the simplest molecule (methane) can be formed with hydrogen (H) atoms that have only one electron in their K-shell. To attain the noble gas configuration, carbon combines with four hydrogen atoms as shown in the figure.Characteristics of organic compounds:They are compounds of carbon. They can exist in all three states i.e., solid, liquid, and gas. They are covalent compounds. They are soluble in organic solvents. They are poor conductors of electricity. They are volatile and flammable.On the basis of structureOpen chain or aliphatic compounds.Closed chain or cyclic compounds. On the basis of ring systemCarbocyclic or homocyclic compounds have a ring comprising only of carbon atoms.Heterocyclic compounds contain other elements besides carbon in the ring. Organic Compounds -Shapes and StructuresA Swedish chemist named Berzilius proposed the vital force theory, according to which a vital force existing in living organisms is responsible for the formation of organic compounds.However, this was proved to be incorrect when F. Wohler, a German chemist synthesised urea- an organic compound from ammonium cyanate, an inorganic compound.Shape of carbon compoundsMethane: CH4 sp3 hybridised carbonEthene: C2H4 sp2 hybridised carbonEthyne: C2H2 sp hybridized carbonsp orbital has 50% 's' character. Thus, an sp hybridised carbon is more electronegative than an sp2(33% s character) or sp3(25% s-character) hybridised carbon.Hybridisation influences the bond length and bond enthalpy.Some Characteristic Features of-BondsParallel orientation of two p-orbitals on adjacent atoms is necessary for a proper sideways overlap to form-bond.Rotation about C = C double bond is restricted.Electron charge cloud of-bond is located above and below the plane of bonding atoms.Electrons are easily available to attacking reagents.Structural Representations of Organic CompoundsComplete Structural FormulaCondensed Structural Formula(Structural formula obtained by omitting some or all of the dashes representing covalent bonds and then using a subscript to indicate the number of identical groups attached to an atom)Ethane: CH3-CH3Ethyne: HC CHMethanol: CH3OHAcetic acid: CH3COOH Bond-Line Structural FormulaOnly lines are used to represent the structure of organic compound.Carbon and hydrogen atoms are not shown.Lines representing the C - C bonds are drawn in a zig-zag fashion.For example - bone-line formula of 2,3-dimethylhexane can be represented as(I) Acyclic or open chain compounds consist of straight or branched chains compounds.(II) Alicyclic or closed chain or ring compounds contain carbon atoms joined in the form of a ring (homocyclic). In some rings (heterocyclic), atoms other than carbon are present.Benzenoid aromatic compounds (include benzene and other related compounds)Non-benzenoid compounds (do not contain benzene ring)Heterocyclic aromatic compoundsAn atom or group of atoms joined in a specific manner which is responsible for the characteristic chemical properties of the organic compound.Examples: Hydroxyl group (- OH), carboxylic acid group (- COOH), aldehyde group (- CHO), ether group (-O-), ketone group, etc.A group or a series of organic compounds each containing a characteristic functional group.The members of the series are called homologues.Successive members differ from each other in a molecular formula by a -CH2unit.Alkanes, alkenes, alkynes, alkanoic acids, amines, etc. represent homologous series.The compounds of carbon having only single bonds between the carbon atoms are called saturated compounds.For example, a molecule of ethane (C2H6)contains one single bond between the carbon atoms.Similarly, butane (C4H10)can exist in two different structures, I and II. Both these structures contain three single bonds between the carbon atoms.The compounds of carbon having double and triple bonds between the carbon atoms are called unsaturated compounds.For example, ethene is an unsaturated compound containing one double bond between the carbon atoms.Similarly, ethyne is an unsaturated compound containing one triple bond between the carbon atoms.The chains, branches, and rings that carbon forms by forming bonds with it can be saturated as well as unsaturated.For example, benzene is a six-member ring that contains three double bonds. Thus, it is an unsaturated hydrocarbonThe number of carbon compounds is so vast that there is one branch of chemistry dedicated only to the study of carbon and its compounds. This branch is known as organic chemistry.The compounds of carbon having only single bonds between the carbon atoms are called saturated compounds and those that contain a double or a triple bond between any two carbon atoms are known as unsaturated compounds.For example, a molecule of propane (C3H8) contains two single bonds between the carbon atoms.There are two main groups of hydrocarbons:They are derived from fossil fuels.They are those hydrocarbons which possess straight chain or branched chain structures.1. Alkanes:The general formula of alkanes is CnH(2n+2), n = number of carbon atoms.They contain only single bonds between all the carbon atoms present in a given molecule of an alkane.For example, methane (CH4), ethane (C2H6)etc.The general formula of alkenes is CnH2n, where n = number of carbon atomsThey contain at least one carbon - carbon double bond.For example, ethene (C2H4), propene (C3H6) etc.3. Alkynes:The general formula of alkynes is CnH(2n - 2), where n = number of carbon atomsThey contain at least one carbon-carbon triple bond.For example, ethyne (C2H2), propyne (C3H4) etc. Alicyclic saturated hydrocarbons: They are those saturated hydrocarbons in which the carbon atoms form a ring.Their general formula is similar to that of alkenes (CnH2n). For example, cyclopropaneMembers of this group have a characteristic odour.First recognised aromatic hydrocarbon is Benzene (C6H6)Benzene is a good organic solvent, which is used in the preparation of dyes, medicines, perfumes etc.Consider, a molecule of butane (C4H10) contains three single bonds between the carbon atoms.You must have noticed that these structures have carbon atoms linked to each other in a repeated manner. Such structures are called Chain structures and compounds exhibiting such structures are known as aliphatic compounds.Do you observe anything in the structure of butane? The carbon atoms can be linked in two different ways (I and II). While I is a chain structure, II is a branched structure. Both have the same chemical formula, but they differ in their structures. Such compounds are called Structural isomers.Carbon atoms in a molecule cannot only be linked in a chain or branch form, but these can also be arranged in a ring. For example, benzene, cyclohexane etc.Benzene is a six-member ring that contains three double bonds. Thus, it is an unsaturated hydrocarbon. On the other hand, cyclohexane has only single bonds. Hence, it is a saturated compound.However, the organic compounds which contain at least one benzene ring are known as aromatic compounds. For example, benzene, toluene, xylenes etc.Carbon not only bonds to carbon and hydrogen, but it can also bond to other atoms like halogens (Br, Cl, I, F), nitrogen, oxygen etc. Sometimes, the hydrogen attached to a carbon in a hydrocarbon can also be replaced by another atom. In such cases, the replacing atom is called a heteroatom. A single atom or a group of atoms, which on bonding with a hydrocarbon, modifies the properties of the compound, is referred to as a functional group. Cl/Br Halo-(Chloro/bromo) -Cl, -Br (subtitles for hydrogen atom) Alcohol -OH Oxygen Aldehyde Ketone Carboxylic acid Thus, we see that carbon atoms can be linked to each other, or to hydrogen atoms, or to functional groups. In addition, the functional groups can change their properties.However, it was noticed that the properties of CH3OH, C2H5OH, and C3H7OH are very similar. Can you tell why? This is because they form a part of the Homologous series.Organic compounds that have similar general formula belong to a series called homologous series. The chemical properties of the compounds in the series are the same because of the presence of the same functional group. Therefore, the organic compounds containing same functional group are tested using same identification tests.On the other hand, the organic compounds with different functional groups will have different physical and chemical properties, hence different identification tests are needed to identify them.Alkanes, alkenes, and alkynes form such series in which members differ in mass by 14 atomic mass units. For example, the alkane homologous series contains methane (CH4), ethane (C2H6), propane (C3H8), butane (C4H10), and pentane (C5H12) as its members. Each member differs from the previous one by a CH2 group (or 14 atomic mass units).Let us see the first four members of the alkane family.NameMolecular FormulaMethaneCH4EthaneCH3CH3PropaneCH3CH2CH3ButaneCH3CH2CH2CH3Thus, it is seen that any two consecutive members differ by a common difference of CH2group. Hence, any two consecutive members differ in mass by 14 units.Similarly, in alcohol homologous series, we have methanol (CH3OH), ethanol (C2H5OH), isopropanol (C3H7OH), and butanol (C4H9OH). Organic compounds show an interesting phenomenon called STRUCTURAL ISOMERISM. This phenomenon is shown by organic compounds with same molecular formula but different structural formula. These compounds are called ISOMERS. They have different properties from one another.Structural isomerism arises due to the difference in the arrangement of atoms within the molecule.Types of Isomerism1. Chain/ skeletal/ nuclear isomerism:In this type, there is a difference in the structure of the carbon chain that forms the nucleus of the molecule. For example:2. Position isomerism:It arises due to the difference in the position of the functional group, the carbon-carbon multiple bonds or the substituent group. For example:3. Functional group isomerism:It arises by virtue of the presence of different functional groups. For example:4. Metamerism:In this type, there is a difference in the number of carbon atoms on either side of the functional group.For example:methyl propyl ether: CH3 O C3H7diethyl ether: CH3 CH2 O CH2 CH3IUPAC Nomenclature of Carbon CompoundsEarlier, various organic compounds were known by their common names. However, the number of organic compounds increased at such a rapid pace that it became important to devise a method to name them scientifically to allow the scientists in every part of the world to understand their molecular formula. Hence, the International Union of Pure and Applied Chemistry (IUPAC) devised rules to name organic compounds.In this system of nomenclature, the names are correlated with the structures such that the learner can deduce the structure from the name. However, before the IUPAC system of nomenclature, organic compounds were assigned trivial or common names based on their origin or certain properties. For instance, citric acid is named so because it is found in citrus fruits. Also, the acid found in red ant is named formic acid since the Latin word for ant is 'formica'.Common or trivial names of some organic compoundsCompoundCommon NameCH3COOHAcetic acidCHCl3ChloroformCH3COCH3Acetone(CH3)2CHCH3IsobutaneC6H6Benzene1. The longest continuous chain of carbon atoms should be identified first. This chain may or may not be a straight chain. The naming of various compounds of carbon can be done as follows:The base name of an organic compound depends upon the number of carbon atoms present in the chain. A compound having only one carbon atom starts with 'meth-', two carbon atoms start with 'eth-', and so on. The list of base names for one to ten carbon atoms is given in the following table.Number of carbon atomsBase or root name1Meth-2Eth-3Prop-4But-5Pent-6Hex-7Hept-8Oct-9Non-10Dec-2. The presence of a functional group is indicated by adding either a suffix or prefix to the base or root name.Base names according to the number of C atomsIf a hydrocarbon contains no double or triple bonds i.e., the hydrocarbon is saturated, then it is known as alkane and the suffix -ane is added to the base word.Therefore, CH4 becomes methane and CH3CH3 become ethane.If a compound contains one or more double bonds, then it is known as alkene and the suffix 'ene' is used.If a compound contains one or more triple bonds, then it is called alkyne and the suffix 'yne' is used.Similarly, the presence of other functional groups is indicated by adding different suffixes or prefixes to the root word. The following table shows the list of functional groups along with the suffixes/prefixes used to indicate their presence.Prefixes/suffixes used to indicate different functional groupsIf the last letter of a hydrocarbon is 'e' as in alkanes, then 'e' is deleted when the suffix for the functional group is added. For example, 'e' of pentane is deleted when the suffix '-one' for the ketone group is added. Thus, we obtain pentanone from pentane and not pentaneone.Hence, the name of each compound in a homologous series is based on the name of the basic carbon chain, modified by a prefix or a suffix, indicating the nature of the functional group.Let us name a few compounds using IUPAC nomenclature.Functional groups:Functional groups are structural units within organic compounds that are defined by specific bonding arrangements between specific atoms.AlcoholIf one hydrogen atom of an alkane is displaced byhydroxyl group(-OH), then alcohol compound is obtained. General formula ofalcohol is CnH2n+1OH. Hence, it is represented as R-OHwhere R stands for alkyl group.Aldehyde and KetoneThese are the functional groups containing carbonyl group. The carbon atom of carbonyl group is attached with one alkyl group and one hydrogen atom in case of aldehyde whereas, in case of a ketone carbon atom of carbonyl compound is attached with carbon atoms of two alkyl groups.Carboxylic acidCompounds having -COOH functional group are called carboxylic acid compounds.Some of them are ethanoic acid and propanoic acid. Carboxylic acid containing compounds have "oic" suffix. The general formula of carboxylic acid is A systematic name of an organic compound is generally derived by identifying the parent hydrocarbon and the functional group(s) attached to it. See the example given below.Let us try to name the following compounds.Step - I: Select the longest carbon chain.The longest possible chain of carbon atoms is picked and the compound is named as a derivative of this alkane.Step - II: Assign the lowest number to the side chain.The carbon chain selected is numbered from the end nearest to the side chain or the substituent so as to give the lowest number to the side chain.Step-III: Arrangement of prefixesIn case more than one group is attached to the chain, these should be arranged alphabetically. Each substituent group is located on the parent chain by placing before it the number of carbon atom to which it is attached.Step-IV: Lowest number for functional groupIn case some functional group is present in the chain, the lowest number is given to it.The lowest number is given in the following order of preference:To the principle functional group of the compoundTo the double or triple bond To the substituent atoms or groups designated by prefixesTherefore, the IUPAC name of the above organic compound is 3-Bromo-5- methylhexane.Conversely, using the IUPAC of an organic compound, it's structure can be determined. The following rules help in accomplishing the task:Step - I: Identify the root word. It forms the carbon skeleton in the structure.Step - II: Write the number of carbon atoms as per the root word and number them from any end.Step - III: As per the suffix in the name, ascertain the type of bond present in the compound. If any multiple bond is present, place it between the carbon atoms as stated in the IUPAC name.Step - IV: Place the substituents at the carbon atoms mentioned in the IUPAC name.Step - V: Place the functional group at the designated carbon atom.Step - VI: Complete the valencies of the remaining carbon atoms by attaching hydrogen atoms.For example, consider the given IUPAC name of an organic compound:Hexan-3-ol Step Rule Structure I and II Root word : Hexan Carbon Skeleton: 6 carbon atoms C C C C C - C III Use suffix to identify type of bonds : All single bonds C C C C C - C IV Place of substituents : No substituents C C C C C - C V Place of functional group: At third carbon atom VI Completion of valencies Preparation and Properties of AlkanesAlkanes: As we already know, alkanes are the saturated hydrocarbons with all the valencies of the carbon atoms satisfied, having a general formula CnH2n+2. The main source of alkanes is natural gas and petroleum. The following table gives the sources of some of the important alkanes:Occurrence of Methane and EthaneMethane is the main constituent of marsh gas.Methane is exhaled by animals that feed on food containing cellulose.Methane is found in the intestinal gas of humans and animals.Methane is found in cavities in coal.Ethane occurs along with methane.PreparationFrom Unsaturated HydrocarbonsThe process is called hydrogenation.Metals (Pt, Pd, and Ni) adsorb dihydrogen on their surfaces and activate H - H bond.From Alkyl HalidesReduction of alkyl halides (except fluorides) with zinc and hydrochloric acidWurtz reaction:Alkyl halides on treatment with sodium in presence of dry ether give higher alkanes (containing an even number of carbon atoms).Decarboxylation (i.e., elimination of CO2) of sodium salts of carboxylic acids on heating with soda lime (mixture of NaOH and CaO) gives alkane. The alkanes thus obtained contain one carbon atom less than the carboxylic acid.Kolbe's Electrolysis MethodElectrolysis of an aqueous solution of sodium or potassium salt of a carboxylic acid gives alkane (containing an even number of carbon atoms) at the anode.Important Note: Methane cannot be prepared by this method.Physical Properties of AlkanesNon-polar moleculesDue to weak forces, members from C1 to C4 are gases, C5 to C17 are liquids, and those containing 18 carbon atoms or more are solids at 298 K.Colourless and odourlessSoluble in non-polar solventsHydrophobic in natureBoiling point increases with the increase in molecular mass.Question: Pentane having a continuous chain of five carbon atoms has a boiling point of 309.1 K whereas 2,2-dimethylpropane boils at 282.5 K though they have same molecular mass. Why?When the number of branched chains increases, the molecule attains the shape of a sphere, which results in a smaller area of contact. As a result of this, there are weak intermolecular forces between spherical molecules which can be overcome at low temperatures. Hence the boiling point of pentane is higher than that of 2,2- dimethylpropane.Chemical properties of alkanesCH4(g) + 2O2(g) CO2(g) + 2H2O(l)CH = - 890 kJ mol-1Methane and ethane undergo complete combustion due to low carbon content and thus burn with a blue non-sooty flame.Yield a variety of products on heating with regulated supply of air or dioxygen at high pressure and in the presence of suitable catalystsGenerally, alkanes resist oxidation. However, alkanes having tertiary H atom can be oxidized to corresponding alcohols by acidified KMnO4 or acidified K2Cr2O7.When methane and ethane are burnt in a limited supply of oxygen with no catalyst they form carbon monoxide and water. Further decreased amount of oxygen produces soot that is used in the manufacturing of printing inks and tyres.IsomerisationOn heating in the presence of anhydrous AlCl3 and HCl gas, n-alkanes isomerise to branched-chain alkanes.Aromatization (or Reforming)Heating n-alkanes (with six or more carbon atoms) to 773 K at 10−20 atmospheric pressure in the presence of the oxides of V, Mo, or Cr supported over alumina produces benzene and it's homologues.Pyrolysis or CrackingOn heating to a higher temperature, higher alkanes decompose into lower alkanes or alkenes.Substitution ReactionsUndergo substitution reactions in which one or more hydrogen atoms of alkanes are substituted (replaced) by halogens, nitro group, and sulphonic group.Example - Halogenation, which takes place either at high temperature or in the presence of UV light (or sunlight)Rate of reaction of alkanes with halogens is F2 > Cl2 > Br2 > I2Rate of replacement of hydrogens of alkanes is 3 > 2 > 1Mechanism of halogenation (free radical mechanism)(i) Initiation(ii) PropagationUses of Some Important Alkanes: Methane and Ethane MethaneEthaneSource of CO and H2OPreparation of acetylene, formaldehyde, methanol, chloromethane and tetrachloromethaneDomestic fuel Preparation of ethene, ethanol, ethanal, ethanoic acidPreparation of a useful solvent in dry cleaning (tetraethyllead-1,1,1,- trichloroethane)Fuel AlkenesWe have studied that alkenes are unsaturated hydrocarbons containing carbon-carbon double bonds with general formula CnH2n. They are reactive in nature, so they are hardly found in free state.Preparation and Properties of AlkenesPreparationFrom alkynes: Partial reduction of an alkyne in the presence of partially deactivated palladised charcoal (known as Lindlars catalyst), or in the presence of sodium, in liquid NH3.From Alkyl Halides: On heating alkyl halides (R X) with alcoholic potassium hydroxideThe reaction is known as dehydrohalogenation.It is an example of -elimination (H atom is eliminated from the carbon atom).The rate of reaction depends upon both the nature of halogen atom and the alkyl group. For halogens, the rate of reaction decreases in the orderIodine > Bromine > Chlorine while for alkyl groups, the rate of reaction decreases in the order Tertiary > Secondary > Primary (for alkyl groups)From Vicinal Dihalides: On treatment with zinc metal, vicinal dihalides (dihalides with two halogen atoms attached to two adjacent carbon atoms) give alkenes.CH2Br CH2Br + Zn CH2 = CH2 + ZnBr2CH3CHBr CH2Br + Zn CH3CH = CH2 + ZnBr2This reaction is called dehalogenation.From Alcohols by Acidic Dehydration:From Alcohols by Dehydration using Al2O3as catalystPhysical Properties of AlkenesFirst three members are gases; the next fourteen are liquids; and the higher ones are solids.Ethene is a colourless gas, with a faint sweet smell.All the alkenes are colourless, odourless, insoluble in water and fairly soluble in non polar solvents.Boiling point of alkenes increases regularly with increase in size.Boiling points of straight chain alkenes are higher than those of isomeric branched chain compounds.Chemical Properties of AlkenesAddition of hydrogen:Bromine and chlorine react with alkene to form vicinal dihalides (iodine does not undergo addition reaction under normal conditions).Addition of hydrogen halides: (HX; X = Cl, Br, I)Addition of hydrogen halides to alkenes is an electrophilic addition reaction which results in the formation of alkyl halides.Order of reactivity of hydrogen halides is HI > HBr > HClAddition of hydrogen halides to symmetrical alkenesAddition of hydrogen halides to unsymmetrical alkenesAddition of hydrogen halides to unsymmetrical alkenes follows Markovnikov's rule.Markovnikov's RuleNegative part of the addendum (adding molecule) gets attached to that carbon atom which possesses lesser number of hydrogen atoms.I is the major product.Mechanism:Anti-Markovnikovs Addition (Or Peroxide Effect or Kharash Effect)Addition of HBr to unsymmetrical alkenes in the presence of peroxide gives a product contrary to Markonikovs rule.Peroxide effect is observed only with HBr, and not with HCl and HIHCl bond is stronger (430.5 kJ/mol) and is not cleaved by the free radicals.HI bond is weaker and the iodine free radicals combine to form iodine molecules, instead of adding to the double bond. Some Other Chemical Properties of AlkenesAddition ofH2SO4(In accordance with Markovnikovs rule)Addition of water (In accordance with Markovnikovs rule)With a cold, dilute, aqueous solution of KMnO4 (Baeyers reagent), alkenes are oxidised to give vicinal glycols.Acidic KMnO4 or acidic K2Cr2O7 oxidises alkenes to give ketones or acids (depending upon the nature of alkenes).C2H4 + 3O2 2CO2 + 2H2O + HeatUses:Some of the common uses of ethene are as follows:Manufacture of polyetheneMaking ethanol which is required for making cosmetics and toiletteriesRipening of fruitsManufacture of raw material for detergents (epoxyethane)Producing oxy-ethylene flame (used for cutting and welding purposes)Manufacture of synthetic chemicals AlkynesThe general formula is CnH2n - 2Contain at least one triple bond between two carbon atomsIn IUPAC nomenclature:They are named as derivatives of the corresponding alkanes replacing ane by the suffix yne.The position of the triple bond is indicated by the first the triply bonded carbon.But-2-yne and but-1-yne differ in their structures due to the position of the triple bond. Hence, they are known as position isomers.But-2-yne: CH3 C C CH3But-1-yne: CH3 CH2 C C CHStructure of Triple Bond (Ethyne)Each carbon atom of ethyne has two sp hybridised orbitals.C C sigma bond is formed by head-on overlapping of two sp hybridised orbitals of the two C atoms.2p orbitals of one carbon atom undergo lateral or sideways overlapping with 2p orbitals of other carbon atoms to form two pi () bonds.H C C bond angle is 180.C C bond enthalpy = 823 kJ mol1C C bond length is 120 pm, which is shorter than those of C = C (133 pm) and C C (154 pm) bonds.Preparation of EthynesFrom calcium carbide (CaC2)) Ethyne is prepared by treating calcium carbide (which is obtained by heating quick lime with coke) with water.CaO + 3C CaC2 + COCalcium carbide: CaC2CaC2 + 2H2O Ca(OH)2 + C2H2From vicinal dihalidesPhysical Properties of AlkynesFirst three members are gases; the next eight are liquids; and the higher ones are solids.Colourless, odourless (except ethyne)Weakly polar in natureLighter than water; immiscible with water, but soluble in organic solvents such as ethers, CCl4, benzene, etc.Melting point, boiling point, and density increase with the increase in molar mass.Chemical Properties of AlkynesHydrogen atoms of ethyne (or any other alkyne), attached to the triply bonded carbon atom, are acidic in nature.Addition Reactions of AlkynesIn unsymmetrical alkynes, addition takes place according to Markovnikovs rule.Addition of dihydrogenIt is used as a test for unsaturation.Addition of hydrogen halides (HX; X = Cl, Br, I)HX adds to alkynes to form gem halides (in which two halogens are attached to the same carbon atom).Addition of waterGenerally, these do not react with water. However, on warming alkynes with mercuric sulphate and dilute sulphuric acid at 333 K, one molecule of water adds to them to form carbonyl compounds.PolymerisationLinear polymerisation Polyacetylene or polyethyne is produced by linear polymerisation of ethene.Repeating units CH = CH CH = CHRepresented as2HC CH + 5O2 4CO2 + 2H2O + HeatUses:Some of the uses of ethyne are as follows:Oxy-acetylene welding at very high temperaturesIlluminant in oxy-acetylene lampRipening and preservation of fruitsManufacture of several products like polymers. artificial rubber, oxalic acid, acetaldehyde, acetic acid, etc.Test to Distinguish between Alkanes, Alkenes and AlkynesSome Commercially Important AlcoholsClassification of AlcoholsOn the basis of the number of OH groups:One OH group: Monohydric alcohol, for example, methanol (CH3OH)Two OH groups: Dihydric alcohol, for example, glycol (OHCH2CH2OH)Three OH groups: Trihydric alcohol, for example, glycerol(HOCH2CH(OH)CH2OH)Methanol (CH3OH)Known as wood spiritPreparationEarlier produced by destructive distillation of woodNowadays, it is produced by catalytic hydrogenation of carbon monoxidePropertiesColourless liquidBoiling point = 337 KHighly poisonous Small quantities cause blindness and large quantities cause even death.UsesAs a solvent in paints and varnishesIn the preparation of formaldehyde (HCHO)Ethanol or Ethyl alcohol, CH3CH2OH Ethanol is commonly known as alcohol. It is an active ingredient of all alcoholic beverages, namely beer, wine, whisky, rum etc.It is also referred to as spirit of wine It is also present in digestive and cough syrups. It is a neutral compound and has no effect on litmus paper.In industries, ethanol is produced by the fermentation of sugar and hence known as grain alcohol. Intake of even a small quantity of pure ethanol can be lethal. If ethanol is consumed regularly for a very long time, then it can lead to many health problems and can also prove fatal.Do You Know:Ethanol is usually obtained from sugarcane. Sugarcane contains a large amount of sucrose. When molasses (a concentrated and dark liquid formed by boiling sugarcane juice) is fermented, ethanol is obtained.Preparation of Ethanol:Industrial preparation of ethanol by fermentation method:Sugarcane juice, juice of fruits or grapes, molasses undergoes fermentation reaction in presence of invertase enzyme to form glucose and fructose.Laboratory method : By hydrolysis of alkyl halides with dilute hot alkaliIndustrial method: By hydration of ethene

using:Concentrated H2SO4 at 80 C and 30 atmH3PO4 at 300C and 60 atmIt is a colourless liquid at room temperature, having a pleasant odour and inflammable toxic liquid.It is completely miscible with water in all proportions and in organic solvents as well.It is a very good organic solvent. Therefore, it is used in a lot of medicines, syrups, and tonics.It is lighter than water.Its consumption affects brain, liver and kidney.Chemical properties:1. Reaction with sodium: Ethanol reacts with sodium to produce hydrogen gas. Sodium ethoxide is also obtained in the reaction.2CH3CH2OH + 2 Na 2CH3CH2O-Na++ H22.Dehydration reaction: When ethanol is heated with concentrated sulphuric acid, it loses one water molecule and gives ethene as a product.This reaction is known as dehydration reaction. In a chemical reaction, a substance is said to be dehydrated if it loses one or more water molecules. In this reaction, concentrated sulphuric acid acts as a dehydrating agent and removes water molecules from ethanol.3. Combustion reaction: Combustion of alcohol results in the formation of carbon dioxide and water along with a large amount of heat and light energy.CH3CH2OH + 3O2 2CO2+ 3H2O + Heat + LightDo You Know:As a large amount of energy is obtained when alcohol burns, it is used as an additive to petrol in some countries.It burns to give only carbon dioxide and water. Thus, it is a clean fuel. It does not give out poisonous gases such as sulphur dioxide and nitrogen dioxide. Coal and petroleum contain nitrogen and sulphur, which causes pollution. Hence, they are not clean fuels.4.Oxidation with acidifiedK2Cr2O7. Alcohols are oxidised by oxidising agent to aldehydes. Further oxidation results in the conversion of the respective aldehydes to corresponding carboxylic acids.5.Esterification reaction. This reaction results in the formation of fruity smelling esters by the combination of alcohol and carboxylic acids in the presence of concentrated H2SO4.6. Reaction with phosphorous halide, alkyl halides are formed in this reaction .3 CH3OH + PCl3 3CH3Cl +H3PO33 C2H5OH + PCl3 3C2H5Cl + H3PO3UsesAs a solvent in manufacture of paint and a number of carbon compoundsDenaturation of alcohol Commercial alcohol becomes unfit for drinking by mixing some copper sulphate (to give it a colour) and pyridine (a foul smelling liquid). This is known as denaturation of alcohol.Commercially Important Forms of EthanolDenatured alcohol:Addition of poisonous substances like pyridine, methyl alcohol to pure ethanol for making it unfit for consumptionAlso called methylated spiritContains 5% methyl alcoholUsed for industrial purposesSpurious alcohol:Illicit liquor prepared by improper distillationContains large portions of methanolFatal for human consumptionUsed as a solvent for paints and varnishesProperties and Reactions of Ethanoic AcidCarboxylic acids are carbon compounds containing carboxyl functional group COOH. The carboxyl group is named so because it consists of a carbonyl group attached to a hydroxyl group. Examples of carboxylic acid include methanoic acid (HCOOH), ethanoic acid (CH3COOH), propanoic acid (C2H5COOH), etc.Classification of Carboxylic AcidsOn the basis of number of COOH groupsOne COOH group: Monocarboxylic acid, for example, HCOOH, CH3COOH, etc.Two COOH groups: Dicarboxylic acid, for example, HOOCCOOH, etc.Now, let us discuss an industrially important carboxylic acid.Acetic AcidAcetic acid is the common name of ethanoic acid (CH3COOH). Its dilute solution in water is known as vinegar, which is used for preserving food. Only 5-8 % solution of ethanoic acid is called vinegar, which is used as a preservative in pickles and salads.It is a weak acid in nature and turns blue litmus paper red.Structure of acetic acidPreparation of acetic acidLaboratory preparation: By oxidation of ethanol or ethanal (acetaldehyde) using acidified potassium dichromate solutionFrom acetylene using concentrated H2SO4 and HgSO4From catalytic oxidation of ethanol over platinum rodIt is a colourless, pungent smelling liquid.The melting point of ethanoic acid is 290 K. This is below room temperature. Thus, it freezes during winters. It looks similar to ice when it freezes. Therefore, it is also known as glacial acetic acid.It boils at a temperature of 118C.It is miscible with water, alcohol and ether in all proportions. It is hygroscopic in nature.Acetic acid is a weak acid. The following reactions prove the acidic nature of acidic acid.It turns blue litmus red.It reacts with active metals such as Zn and Mg to evolve hydrogen gas.Reaction with alcohol or esterification reaction: The reaction of a carboxylic acid with an alcohol to form an ester is known as esterification reaction.Curiosity Corner Esters are sweet smelling organic compounds. As esters are volatile and pleasant to smell, they are generally used for making perfumes. They are also used as flavouring agents because of their fruity smell.When ethanoic acid reacts with ethanol in the presence of an acid, ethyl ethanoate is formed.Esters react in the presence of an acid or a base to give back alcohol and sodium salt of carboxylic acid as:This reaction is used in the preparation of soaps and is known as saponification reaction.Reaction with a base:We know that an acid and a base react to form salt and water. Similarly, ethanoic acid reacts with sodium hydroxide to form a salt, sodium ethanoate, and water. Sodium ethanoate is commonly known as sodium acetate.CH3COOH + NaOH CH3COONa + H2OReaction with carbonates and hydrogen carbonate:Carbonates and bicarbonates are also basic in nature and react with ethanoic acid to form salt and water. Carbon dioxide is also formed in the reaction. The chemical equations involved are given as:Sodium ethanoate is produced in the reaction. It is commonly known as sodium acetate.Reaction with phosphorous pentachlorideAcetic acid reacts with phosphorous chloride to form an acid derivative i.e. acetylchloride.Reaction with phosphorous pentoxideAcetic acid forms another acid derivative when heated with phosphorous pentoxide. The acid derivative is acetic acid anhydride formed after removal of a water molecule from acid by phosphorous pentoxide.Reaction with strong reducing agentAcetic acid gets reduced to ethanol by reaction with a strong reducing agent such as LiAlH4.Tests for Acetic acidReagentObservationNa2CO3or NaHCO3Evolution of gas that turns lime water milky. The gas is CO2.C2H5OH + Conc. H2SO4Fruity smell of esterNeutral FeCl3solutionWind red colourationUse of acetic acidIn the manufacture of vinegar for preserving foodsIn the manufacture of cellulose acetate for photographic filmAs organic solventIn the production of polythene terephthalate used in soft drink bottles.In the manufacture of polyvinyl acetate for synthetic fibres and fabric. TagsClass 10 Chemistry Notes How can financial brands set themselves apart through visual storytelling? Our experts explainhow.Learn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explainhow.Learn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' FavoritesHow can financial brands set themselves apart through visual storytelling? Our experts explainhow.Learn MoreThe Motorsport Images Collections captures events from 1895 to todays most recentcoverage.Discover The CollectionCurated, compelling, and worth your time. Explore our latest gallery of EditorsPicks.Browse Editors' Favorites

Organic chemistry class 10 icse questions. Organic chemistry class 10 icse notes. Organic chemistry class 10 icse important questions pdf. Organic chemistry class 10 icse selina solutions. Organic chemistry class 10 icse dalal solutions. Organic chemistry class 10 icse important questions. Organic chemistry class 10 icse worksheet with answers. Organic chemistry class 10 icse pdf. Organic chemistry class 10 icse explanation. Organic chemistry class 10 icse handwritten notes. Organic chemistry class 10 icse selina pdf. Organic chemistry class 10 icse nomenclature questions. Organic chemistry class 10 icse nomenclature worksheet with answers. Organic chemistry class 10 icse worksheet. Organic chemistry class 10 icse physics wallah.