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AQA (GCSE Notes)

Chapter 7: Organic Chemistry

Q1. What is crude oil and where is it found?

Q2. How is crude oil formed over millions of years?

Q3. What type of organisms mainly contribute to the formation of crude oil?

Q4. Why is crude oil considered a finite resource?

Q5. What is a hydrocarbon?

Q6. Which two elements make up hydrocarbons?

Q7. What is the main type of hydrocarbon found in crude oil?

Q8. What is the general formula for alkanes?

Q9. Name the first four alkanes in the homologous series.

Q10. Write the molecular formula of ethane.

Q11. How can alkane molecules be represented?

Q12. What is meant by a homologous series?

Q13. Why do carbon atoms form so many different compounds?

Q14. What kind of bonds do carbon atoms form with each other?

Q15. How do carbon atoms form rings and chains?

Q16. Why is the chemistry of carbon compounds studied as a separate branch?

Q17. What is the name of the branch of chemistry that studies carbon compounds?

Q18. Why are fossil fuels considered organic compounds?

Q19. What is the role of the petrochemical industry?

Q20. Name four materials made using organic molecules in the chemical industry.

Q21. What are feedstocks in the petrochemical industry used for?

Q22. What is fractional distillation?

Q23. Why is crude oil separated into different fractions?

Q24. What do the molecules in each fraction of crude oil have in common?

Q25. How does fractional distillation separate mixtures?

Q26. Explain the role of evaporation in fractional distillation.

Q27. Explain the role of condensation in fractional distillation.

Q28. Why do different hydrocarbons condense at different levels in the fractionating column?

Q29. Name three fuels that are produced from crude oil.

Q30. What is kerosene used for?

Q31. What is meant by liquefied petroleum gas?

Q32. Give one example of how a fraction from crude oil can be used as a lubricant.

Q33. What are the main uses of petrol and diesel?

Q34. How does the number of carbon atoms affect the boiling point of hydrocarbons?

Q35. Why are solvents important in modern life?

Q36. What is the difference between natural and synthetic carbon compounds?

Q37. Why can carbon form many different families of compounds?

Q38. Give two examples of materials made from synthetic carbon compounds.

Q39. How can chemists use crude oil to make new products?

Q40. Why is the ability to modify organic molecules important?

Q41. How are polymers related to crude oil?

Q42. What is the importance of detergents in daily life?

Q43. What role do perfumes and flavourings play in the chemical industry?

Q44. How do alkanes differ from alkenes?

Q45. Why are alkanes described as saturated hydrocarbons?

Q46. How can you identify a substance as an alkane from its molecular formula?

Q47. What is the significance of using models to represent molecules?

Q48. Why are molecular modelling kits useful in chemistry education?

Q49. Why is crude oil important in our modern lifestyle?

Q50. What are the environmental concerns associated with using crude oil?

Q51. How does the viscosity of hydrocarbons change when the molecules become larger?

Q52. What is the effect of increasing molecular size on the flammability of hydrocarbons?

Q53. Why are shorter-chain hydrocarbons more useful as fuels?

Q54. Explain why hydrocarbons with small molecules are preferred in car engines.

Q55. What are the products of the complete combustion of a hydrocarbon?

Q56. Write a balanced symbol equation for the complete combustion of propane (C_3H_8).

Q57. Write a balanced equation for the complete combustion of butane (C_4H_{10}).

Q58. Why is complete combustion preferred over incomplete combustion?

Q59. What two elements in hydrocarbons are oxidised during combustion?

Q60. Explain the environmental impact of carbon dioxide produced during combustion of hydrocarbons.

Q61. How does the energy released from combustion relate to the size of the hydrocarbon molecule?

Q62. What is meant by the term 'viscosity' when describing hydrocarbons?

Q63. Why do larger hydrocarbons flow more slowly than smaller ones?

Q64. Why do smaller hydrocarbons ignite more easily than larger ones?

Q65. What is the colour and state of bromine water before it reacts?

Q66. Describe what happens when an alkene is added to bromine water.

Q67. How can you use bromine water to distinguish between an alkane and an alkene?

Q68. What type of hydrocarbon is produced alongside alkenes during cracking?

Q69. Why is cracking important in the oil industry?

Q70. What are the two main methods of cracking?

Q71. Describe the conditions required for catalytic cracking.

Q72. What conditions are needed for steam cracking?

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Q73. What is the purpose of using a catalyst in catalytic cracking?

Q74. Give a reason why steam cracking needs a high temperature.

Q75. Why is there a high demand for the products of cracking?

Q76. Explain how cracking helps meet the demand for fuels.

Q77. What is the role of alkenes in the production of polymers?

Q78. Why are alkenes more reactive than alkanes?

Q79. Give one everyday product made from polymers produced using alkenes.

Q80. What is a balanced chemical equation for cracking a long-chain hydrocarbon into an alkane and an alkene?

Q81. Why is cracking described as a thermal decomposition reaction?

Q82. What is the chemical test used to identify an alkene?

Q83. Describe a practical method to show that alkenes are formed during cracking.

Q84. Why can larger hydrocarbons be less useful than smaller ones?

Q85. What type of reaction occurs when a hydrocarbon is burned in plenty of oxygen?

Q86. Why do hydrocarbons release energy when burned?

Q87. What are the dangers of incomplete combustion of hydrocarbons?

Q88. What product is formed during incomplete combustion that is dangerous to humans?

Q89. What is the difference between alkanes and alkenes in terms of bonds?

Q90. Why is it useful to produce alkenes from larger hydrocarbons?

Q91. How does cracking support modern transportation?

Q92. How does the use of hydrocarbons support everyday life?

Q93. What gases are released into the atmosphere during combustion of hydrocarbons?

Q94. Why does cracking help reduce waste from crude oil?

Q95. Name one industrial use of the products formed from cracking.

Q96. What does it mean if a hydrocarbon is saturated?

Q97. What does it mean if a hydrocarbon is unsaturated?

Q98. How can you tell from a formula if a hydrocarbon is an alkene?

Q99. Describe how hydrocarbons are separated before cracking.

Q100. Why are hydrocarbons with low boiling points used in camping stoves?

Q101. What is the general formula for alkenes?

Q102. Why are alkenes described as unsaturated hydrocarbons?

Q103. How many hydrogen atoms are there in a molecule of propene?

Q104. What is the molecular formula of butene?

Q105. How is an alkene different from an alkane in terms of bonding?

Q106. Which functional group is found in all alkenes?

Q107. Name the first four alkenes in the homologous series.

Q108. Write the displayed formula for ethene.

Q109. Write the molecular formula for pentene.

Q110. Why do alkenes burn with a smoky flame?

Q111. What type of combustion do alkenes undergo in air?

Q112. What is the product when ethene reacts with hydrogen?

Q113. What condition is needed for the hydrogenation of alkenes?

Q114. What type of reaction occurs when bromine reacts with ethene?

Q115. What change happens to the carbon-carbon double bond during an addition reaction?

Q116. What is the product of ethene reacting with bromine?

Q117. Describe the test for an alkene using bromine water.

Q118. Why does bromine water decolourise when added to an alkene?

Q119. Write the structural formula of the product formed when ethene reacts with chlorine.

Q120. What is formed when ethene reacts with steam?

Q121. What are the conditions required for the reaction of ethene with steam?

Q122. What is the name of the alcohol formed from the reaction of ethene and water?

Q123. Why are addition reactions important in the chemical industry?

Q124. What type of reaction is the addition of hydrogen to an alkene?

Q125. What type of bond is broken when an alkene undergoes an addition reaction?

Q126. Draw the displayed formula of propene.

Q127. Show the structural formula of the product when propene reacts with iodine.

Q128. How can you distinguish between an alkene and an alkane using a chemical test?

Q129. What happens to the number of hydrogen atoms in a molecule when an alkene reacts with hydrogen?

Q130. What is the product when butene reacts with water?

Q131. Explain why alkenes are more reactive than alkanes.

Q132. Describe the bonding in an ethene molecule.

Q133. How does the presence of a double bond affect the shape of an alkene molecule?

Q134. Which element must be present in all halogenation reactions of alkenes?

Q135. What is the purpose of using a catalyst in the hydrogenation of alkenes?

Q136. Draw the displayed formula of butene reacting with chlorine.

Q137. Write the balanced equation for the reaction between ethene and bromine.

Q138. What is the main product formed from the hydration of ethene?

Q139. Why are alkenes often used as starting materials in making polymers?

Q140. Describe the appearance of bromine water before and after it reacts with an alkene.

Q141. What happens to the double bond in ethene when it reacts with iodine?

Q142. What does the term 'addition reaction' mean?

Q143. What type of molecule is produced when ethene reacts with chlorine?

Q144. Give one industrial use of the hydrogenation of alkenes.

Q145. Describe what is meant by a homologous series.

Q146. What colour change is observed when ethene is bubbled through bromine water?

Q147. How many carbon atoms are there in pentene?

Q148. Which product is formed when ethene reacts with HCl?

Q149. Why do alkenes burn with more soot than alkanes?

Q150. Draw the fully displayed structure of the product when propene reacts with hydrogen.

Q151. What is the functional group present in alcohols?

Q152. Write the displayed formula for ethanol.

Q153. How many carbon atoms does propanol have?

Q154. Describe what happens when ethanol reacts with sodium.

Q155. What gas is released when alcohols react with sodium?

Q156. What happens when methanol is burned in air?

Q157. Write a word equation for the combustion of butanol.

Q158. Describe the solubility of ethanol in water.

Q159. What is observed when an alcohol is added to water?

Q160. What type of compound is formed when an alcohol reacts with an oxidising agent?

Q161. Describe a use of methanol.

Q162. Name one common use of ethanol in the home or industry.

Q163. What is the main alcohol found in alcoholic drinks?

Q164. Name one use of propanol.

Q165. What conditions are required for the fermentation of sugars using yeast?

Q166. What is the role of yeast in fermentation?

Q167. What type of sugar is used in fermentation?

Q168. What gas is produced during fermentation?

Q169. Why is the fermentation process carried out in the absence of air?

Q170. At what temperature is fermentation most efficient?

Q171. How can you recognise an alcohol from its name?

Q172. Which functional group helps to identify alcohols?

Q173. How can you tell from a formula that a compound is an alcohol?

Q174. Name the first four members of the alcohol homologous series.

Q175. What is a homologous series?

Q176. What happens to the reactivity of alcohols as the number of carbon atoms increases?

Q177. Describe one way to test for the presence of alcohol in a liquid.

Q178. What product forms when an alcohol is oxidised?

Q179. What is the functional group in carboxylic acids?

Q180. Name the carboxylic acid with two carbon atoms.

Q181. Write the displayed formula for ethanoic acid.

Q182. Describe what happens when a carboxylic acid reacts with a carbonate.

Q183. What gas is produced when carboxylic acids react with carbonates?

Q184. What is observed when a carboxylic acid dissolves in water?

Q185. Do carboxylic acids fully ionise in water?

Q186. Why are carboxylic acids called weak acids?

Q187. How does the pH of a carboxylic acid compare to a strong acid of the same concentration?

Q188. Describe what happens when a carboxylic acid reacts with an alcohol.

Q189. What is formed when a carboxylic acid reacts with an alcohol?

Q190. What catalyst is used in the reaction between a carboxylic acid and an alcohol?

Q191. Name the ester formed from ethanol and ethanoic acid.

Q192. How can you recognise a carboxylic acid from its name?

Q193. What does the –COOH group represent?

Q194. How can you tell from a formula that a compound is a carboxylic acid?

Q195. List the first four carboxylic acids in the homologous series.

Q196. What type of bonding is found in the functional group of carboxylic acids?

Q197. What type of reaction is it when a carboxylic acid reacts with a carbonate?

Q198. What is the general pH range for carboxylic acids?

Q199. Describe a test to show that carbon dioxide is produced in the reaction with a carbonate.

Q200. What would you observe if ethanoic acid was added to sodium carbonate solution?

Q201. What is meant by the term "addition polymerisation"?

Q202. What type of small molecules are used to make addition polymers?

Q203. Why are alkenes suitable monomers for addition polymerisation?

Q204. What is the functional group present in alkene monomers?

Q205. What happens to the double bond in alkenes during polymerisation?

Q206. Give an example of an addition polymer made from ethene.

Q207. Give an example of an addition polymer made from propene.

Q208. What does the term "monomer" mean in polymer chemistry?

Q209. What does the term "polymer" mean in polymer chemistry?

Q210. What is meant by the term "repeating unit" in a polymer chain?

Q211. How can you identify the repeating unit in a polymer chain?

Q212. Draw the structure of ethene and show how it forms poly(ethene).

Q213. Draw the structure of propene and show how it forms poly(propene).

Q214. Why is no other molecule formed in addition polymerisation?

Q215. What is the difference between a monomer and a repeating unit?

Q216. Describe how the atoms in the monomer are arranged in the polymer.

Q217. How can you recognise an addition polymer from a diagram?

Q218. How does the molecular structure of a monomer change during polymerisation?

Q219. Explain why the polymer has the same atoms as the monomer.

Q220. Why are addition polymers called "addition" polymers?

Q221. What is meant by the term "poly(ethene)"?

Q222. Why are the names of polymers usually written with "poly" in front?

Q223. Give the full name of the polymer made from chloroethene.

Q224. Write the displayed formula of ethene and its polymer.

Q225. How can you use the monomer structure to draw the repeating unit?

Q226. What does the square bracket in a polymer structure represent?

Q227. What does the small letter "n" mean in a polymer diagram?

Q228. What is the general structure of a polymer made from an alkene?

Q229. Draw the repeating unit for poly(butene).

Q230. Why must the carbon-carbon double bond open in addition polymerisation?

Q231. Describe how you would draw a polymer from a given alkene monomer.

Q232. What is the role of the double bond in forming a polymer?

Q233. How does the number of carbon atoms in a monomer affect the polymer?

Q234. Can addition polymers be made from molecules without a double bond? Explain.

Q235. Why are addition polymers usually unreactive?

Q236. Why are addition polymers useful in making plastic products?

Q237. Why are addition polymers difficult to break down in the environment?

Q238. What is meant by the term "non-biodegradable" when referring to polymers?

Q239. Give one environmental problem caused by waste addition polymers.

Q240. Suggest one way to reduce the amount of plastic waste.

Q241. What is meant by the term "recycling" in the context of polymers?

Q242. Explain how the structure of poly(propene) differs from poly(ethene).

Q243. Name the polymer made from the monomer $CH_2=CHCl$.

Q244. Give one use of poly(ethene) in everyday life.

Q245. Why is poly(propene) more rigid than poly(ethene)?

Q246. Why do polymers have high melting points?

Q247. How does the length of the polymer chain affect its properties?

Q248. Draw a repeating unit from a monomer with four carbon atoms and one double bond.

Q249. How do you identify the monomer from a given repeating unit?

Q250. Describe the steps to convert a displayed alkene formula into its polymer form.

Q251. What is meant by condensation polymerisation?

Q252. Why is a small molecule such as water formed during condensation polymerisation?

Q253. Describe the two functional groups needed on a monomer for condensation polymerisation to occur.

Q254. Explain how ethanediol and hexanedioic acid react to form a polyester.

Q255. What type of bond forms between the monomers during polyester formation?

Q256. How is the repeating unit in a polyester different from the monomers used?

Q257. Draw the structure of the repeating unit formed when ethanediol reacts with hexanedioic acid.

Q258. How many different monomers are usually involved in simple condensation polymerisation?

Q259. What functional group is formed when an alcohol reacts with a carboxylic acid in a condensation reaction?

Q260. Why are the monomers used in condensation polymerisation described as bifunctional?

Q261. Describe the role of each functional group in forming a polyester.

Q262. Explain how models can help represent condensation polymerisation.

Q263. Why are the properties of a polymer different from the monomers used to make it?

Q264. What is a diol and why is it important in condensation polymerisation?

Q265. Give one example of a natural condensation polymer.

Q266. What is the difference between addition and condensation polymerisation in terms of by-products?

Q267. Compare the structures of a polyester and a polyalkene.

Q268. What feature of a monomer allows it to form long chains in condensation polymerisation?

Q269. Describe how the length of a polyester chain might affect its physical properties.

Q270. Why can polyesters be broken down more easily than polyalkenes?

Q271. Name the functional group found in all esters.

Q272. Write the general formula for a condensation reaction between a diol and a dicarboxylic acid.

Q273. What is meant by a repeating unit in a polymer?

Q274. How do you identify the repeating unit from a polymer chain?

Q275. How does condensation polymerisation occur in two dimensions?

Q276. What is meant by 2D representation of a polymer?

Q277. Explain how a polymer can be drawn to show the loss of water in condensation polymerisation.

Q278. What happens to the end groups of monomers during condensation polymerisation?

Q279. How many water molecules are lost when three monomers join in a condensation reaction?

Q280. What is the main difference in the monomers used in condensation polymerisation compared to addition polymerisation?

Q281. What are the two functional groups present in an amino acid molecule?

Q282. Describe what happens when amino acids react together.

Q283. What type of polymer is formed from amino acids?

Q284. Explain what a peptide bond is and how it forms.

Q285. Why are amino acids described as having two functional groups?

Q286. Draw the structure of glycine and identify its functional groups.

Q287. What small molecule is lost when two amino acids react together?

Q288. What is a polypeptide and how is it related to proteins?

Q289. Describe how different amino acids form proteins.

Q290. How does the sequence of amino acids affect the structure of a protein?

Q291. What is the general formula of an amino acid?

Q292. Why are proteins described as natural polymers?

Q293. Explain how a chain of amino acids is different from a polyester.

Q294. What bond forms between amino acids in a polypeptide?

Q295. Describe the functional group that links amino acids in a polypeptide chain.

Q296. How many water molecules are formed when four amino acids polymerise?

Q297. What role do proteins play in living organisms?

Q298. How can 3D models help in understanding protein structure?

Q299. What is meant by the term 'condensation reaction' in protein formation?

Q300. Describe how the polymerisation of amino acids is similar to the polymerisation of diols and dicarboxylic acids.

Q301. What type of polymer is DNA made from?

Q302. What are the monomers called that make up DNA?

Q303. How many different types of nucleotide monomers are found in DNA?

Q304. What shape does the DNA polymer form?

Q305. Which two components make up the backbone of a DNA molecule?

Q306. What are the four different bases found in DNA?

Q307. What type of bond holds the two strands of DNA together?

Q308. What is meant by a double helix structure in DNA?

Q309. How are the nucleotide bases arranged in DNA?

Q310. Why is DNA described as a polymer?

Q311. Which part of the nucleotide varies between the four DNA monomers?

Q312. Name one naturally occurring polymer made from amino acids.

Q313. What type of biological molecule is starch?

Q314. What type of monomer forms starch?

Q315. What is the monomer unit of cellulose?

Q316. How do the structures of starch and cellulose differ?

Q317. How do the functions of proteins and DNA differ in the body?

Q318. What is the role of proteins in living organisms?

Q319. How are the monomers in DNA joined together?

Q320. What is the function of DNA in a cell?

Q321. What elements are found in a nucleotide?

Q322. Which two naturally occurring polymers are made from sugars?

Q323. What is the difference between a polymer and a monomer?

Q324. How is the sequence of bases in DNA important?

Q325. What process copies DNA in cells?

Q326. What kind of reaction forms DNA polymers from nucleotides?

Q327. What does each nucleotide in DNA consist of?

Q328. What is the difference between RNA and DNA?

Q329. What is a gene?

Q330. Why is DNA called a naturally occurring polymer?

Q331. Name two polymers formed from glucose monomers.

Q332. What is the role of cellulose in plants?

Q333. What feature makes proteins different from each other?

Q334. What is the name of the bond that links amino acids?

Q335. How are amino acids different from nucleotides?

Q336. What type of reaction joins amino acids in proteins?

Q337. What determines the function of a protein?

Q338. What are enzymes made from?

Q339. Why are proteins called polymers?

Q340. How do plants make starch?

Q341. What part of a nucleotide contains nitrogen?

Q342. How many strands are there in a molecule of DNA?

Q343. What makes each protein unique?

Q344. What is the function of starch in a plant cell?

Q345. What is the sugar component of DNA?

Q346. How are cellulose molecules arranged in plant cell walls?

Q347. Why can starch be broken down into glucose?

Q348. How are DNA and proteins similar in structure?

Q349. What does the order of bases in DNA determine?

Q350. Name one difference between starch and cellulose.