GRADEUP

AQA (GCSE Notes)

Chapter 5: Energy Changes

Q1. What happens to the energy in the universe during a chemical reaction?

Q2. Why do the products of an exothermic reaction have less energy than the reactants?

Q3. What is an exothermic reaction?

Q4. How does the temperature of the surroundings change during an exothermic reaction?

Q5. Give two examples of exothermic reactions.

Q6. Name two everyday items that use exothermic reactions.

Q7. What is an endothermic reaction?

Q8. How does the temperature of the surroundings change during an endothermic reaction?

Q9. Give an example of an endothermic reaction.

Q10. Why does the temperature of the surroundings decrease in an endothermic reaction?

Q11. What is the role of energy in an endothermic reaction?

Q12. Why are sports injury packs based on endothermic reactions?

Q13. What kind of energy transfer occurs in a neutralisation reaction?

Q14. What kind of energy transfer occurs in a thermal decomposition reaction?

Q15. How can you identify whether a reaction is exothermic or endothermic by measuring temperature?

Q16. Why do some reactions warm up the surroundings?

Q17. Why do some reactions cool down the surroundings?

Q18. What type of reaction occurs in self-heating cans?

Q19. What can you measure to determine if a reaction is exothermic or endothermic?

Q20. What is the minimum amount of energy needed for a reaction to take place?

Q21. What is activation energy?

Q22. Why is activation energy needed for a reaction to start?

Q23. What does a reaction profile show?

Q24. How can reaction profiles help identify if a reaction is exothermic?

Q25. How can reaction profiles help identify if a reaction is endothermic?

Q26. What does the curved line in a reaction profile represent?

Q27. In a reaction profile, what does the peak represent?

Q28. How is the activation energy shown in a reaction profile?

Q29. How is the overall energy change shown in a reaction profile?

Q30. What is meant by the term 'overall energy change' in a chemical reaction?

Q31. What are the relative energy levels of reactants and products in an exothermic reaction?

Q32. What are the relative energy levels of reactants and products in an endothermic reaction?

Q33. Why is it useful to draw reaction profiles?

Q34. What is the purpose of conducting experiments to measure temperature change in reactions?

Q35. How can dissolving a substance in water help investigate energy changes?

Q36. Why is it important to control variables in a temperature change experiment?

Q37. What variables could affect the temperature change in a reaction between acid and metal?

Q38. How would you set up an experiment to investigate temperature change during neutralisation?

Q39. What observations would show a displacement reaction is exothermic?

Q40. How would you measure the temperature change in a reaction safely?

Q41. Why is it important to repeat the experiment when measuring temperature changes?

Q42. What is the significance of comparing temperature changes in different reactions?

Q43. How does the reaction between citric acid and sodium hydrogencarbonate demonstrate an endothermic process?

Q44. What conclusion can be drawn if the temperature rises after a reaction?

Q45. What conclusion can be drawn if the temperature drops after a reaction?

Q46. How would you identify the activation energy from a reaction profile diagram?

Q47. What would a reaction profile look like for a highly exothermic reaction?

Q48. What would a reaction profile look like for a reaction with high activation energy?

Q49. Why might a reaction with high activation energy not happen at room temperature?

Q50. How does temperature influence whether a reaction will occur or not?

Q51. What happens to energy when bonds in the reactants are broken during a chemical reaction?

Q52. Why is energy released when new bonds are formed in the products?

Q53. How can bond energies be used to calculate the energy change in a chemical reaction?

Q54. What is meant by the term "overall energy change" in a chemical reaction?

Q55. In an exothermic reaction, which is greater: energy released or energy needed?

Q56. In an endothermic reaction, which is greater: energy needed or energy released?

Q57. What kind of energy change occurs when the bonds formed in products release more energy than the energy required to break reactant bonds?

Q58. How does bond breaking affect the energy profile of a reaction?

Q59. What does a positive energy change mean in a chemical reaction?

Q60. What does a negative energy change indicate in terms of exothermic or endothermic?

Q61. Describe how you would calculate the energy change of a reaction using bond energies.

Q62. Why is it important to consider both bond breaking and bond forming when calculating energy changes?

Q63. What is the significance of bond energy values in predicting reaction types?

Q64. How can bond energy calculations help identify whether a reaction is exothermic or endothermic?

Q65. If more energy is released in forming bonds than is absorbed in breaking them, what type of reaction is it?

Q66. If a reaction absorbs more energy in breaking bonds than it releases in forming them, what type of reaction is it?

Q67. What are the typical units used when calculating bond energy changes?

Q68. Why are bond energies considered average values?

Q69. Give a reason why the calculated energy change may differ from experimental results.

Q70. How does the strength of chemical bonds relate to the energy required to break them?

Q71. How does the number of bonds broken or formed affect the total energy change?

Q72. How would you explain the energy changes involved in a neutralisation reaction?

Q73. What energy change would you expect in a combustion reaction and why?

Q74. Why do stronger bonds usually require more energy to break?

Q75. What information do you need to calculate the energy transferred in a chemical reaction?

Q76. What is the purpose of using bond energies in energy change calculations?

Q77. How does the energy needed to break a triple bond compare to a single bond?

Q78. Why might a chemical reaction with a positive energy change feel cold to the touch?

Q79. Describe what happens to energy during the breaking of O=O bonds in a reaction.

Q80. How do different elements affect the bond energy values in compounds?

Q81. What type of bond energy data is used for polyatomic molecules?

Q82. How would you identify whether a reaction has high or low activation energy using bond energies?

Q83. Can bond energy values help in designing energy-efficient reactions? Explain how.

Q84. What does a large overall energy change suggest about a reaction?

Q85. In a reaction where energy change is zero, what can you say about the bond energies of reactants and products?

Q86. How does the conservation of energy apply to chemical reactions involving bond energies?

Q87. Why might experimental temperature change data not exactly match bond energy calculations?

Q88. What assumptions are made when using bond energy values in calculations?

Q89. How can bond energies be used to compare the stability of two chemical reactions?

Q90. What safety precautions should be taken when conducting experiments involving exothermic reactions?

Q91. Describe a method to calculate the energy change of a reaction using bond energy data for $H_2 + Cl_2 \rightarrow 2HCl$.

Q92. What conclusion can you draw if bond energy calculations predict an exothermic reaction but no reaction occurs?

Q93. What factors other than bond energies can affect whether a chemical reaction occurs?

Q94. How might bond energy calculations differ for reactions in solution versus gas phase?

Q95. What are the limitations of using bond energy values for reactions with intermediate steps?

Q96. Why is it useful to understand energy changes in everyday chemical reactions like cooking or combustion?

Q97. How can energy profile diagrams be supported with bond energy data?

Q98. What role does enthalpy play in bond energy calculations?

Q99. In what situations would bond energy calculations be most accurate?

Q100. Why might two reactions with similar bond energy changes differ in reaction rates?

Q101. What is a simple cell and how can it be constructed using two different metals and an electrolyte?

Q102. Why does the voltage of a cell depend on the type of metal used for the electrodes?

Q103. How does the choice of electrolyte affect the voltage of a cell?

Q104. What happens at the electrodes in a simple electrochemical cell?

Q105. Explain why using metals with a greater difference in reactivity produces a higher voltage in a cell.

Q106. What is the function of the electrolyte in a simple cell?

Q107. Describe what is meant by a non-rechargeable battery.

Q108. Why do chemical reactions in a non-rechargeable cell eventually stop?

Q109. What are alkaline batteries and why are they classed as non-rechargeable?

Q110. Describe what happens during the recharging of a rechargeable battery.

Q111. Why can rechargeable batteries be used multiple times?

Q112. What is the role of an external electrical current in recharging a cell?

Q113. What are the advantages of using rechargeable batteries over non-rechargeable ones?

Q114. Why is it important to use batteries with care, especially those containing liquids?

Q115. How can you safely test a simple cell in the classroom?

Q116. What precautions should be taken when handling electrolytes during experiments?

Q117. Why is it important to compare the voltage of different metal combinations in cells?

Q118. How can data on metal reactivity be used to predict the voltage of a cell?

Q119. What evidence from an experiment would show that one metal is more reactive than another?

Q120. Describe a method for testing the voltage produced by different metal pairs in a cell.

Q121. What is meant by connecting cells in series?

Q122. How does connecting cells in series affect the overall voltage?

Q123. What might happen if you connect cells in the wrong way in a circuit?

Q124. How can you increase the voltage output of a battery using simple cells?

Q125. Why do batteries eventually run out of energy?

Q126. What does it mean when a battery is said to be ‘flat’?

Q127. What factors can affect how long a battery lasts?

Q128. How can the reactivity series help in designing more efficient cells?

Q129. Why is it important to evaluate the environmental impact of different types of batteries?

Q130. How do different combinations of metals influence the energy output of a cell?

Q131. What is the purpose of using two different metals in a cell rather than two of the same metal?

Q132. Why does the flow of electrons only occur when the two metals have different reactivities?

Q133. What is meant by the term ‘cell voltage’?

Q134. What practical uses are there for batteries made from multiple simple cells?

Q135. Why might one battery be better suited to a device than another?

Q136. How would you set up an experiment to compare different cells safely?

Q137. What could cause errors when measuring the voltage of a cell?

Q138. Why must we handle battery chemicals with care?

Q139. What are some safety risks when using or making electrochemical cells?

Q140. Why do rechargeable batteries have a limited number of charge cycles?

Q141. How can temperature affect the performance of a battery?

Q142. What is the environmental advantage of using rechargeable batteries?

Q143. How is the energy transfer in a battery different from that in a mains-powered circuit?

Q144. Why is it important to interpret data correctly when evaluating metal combinations?

Q145. What can voltage measurements tell you about the reactivity of two metals?

Q146. Why should you never short-circuit a battery?

Q147. In a classroom setup, how can students safely dispose of used battery chemicals?

Q148. How does the internal resistance of a cell affect its voltage output?

Q149. Why is it useful to understand how cells and batteries work in everyday life?

Q150. What would you expect to happen if the electrolyte in a cell dries up or leaks?

Q151. What is the role of hydrogen in a hydrogen fuel cell?

Q152. What is the role of oxygen in a hydrogen fuel cell?

Q153. How does a hydrogen fuel cell generate electricity?

Q154. What is the overall chemical reaction in a hydrogen fuel cell?

Q155. How is water formed in a hydrogen fuel cell?

Q156. Why is hydrogen described as being oxidised in the fuel cell?

Q157. What happens to the electrons from hydrogen during the reaction?

Q158. How is the potential difference created in a hydrogen fuel cell?

Q159. How are fuel cells different from rechargeable batteries?

Q160. Why do hydrogen fuel cells not need recharging like batteries?

Q161. What are the environmental advantages of using hydrogen fuel cells?

Q162. What are the environmental disadvantages of using hydrogen fuel cells?

Q163. Why is it important to evaluate the source of hydrogen used in fuel cells?

Q164. What problems could arise from storing and transporting hydrogen fuel?

Q165. How do hydrogen fuel cells perform in vehicles compared to traditional petrol engines?

Q166. Why are fuel cells used in some spacecraft and submarines?

Q167. How is hydrogen gas usually produced for fuel cells?

Q168. What are the limitations of using electrolysis to produce hydrogen for fuel cells?

Q169. What role do catalysts play in hydrogen fuel cells?

Q170. Why must a hydrogen fuel cell have a membrane?

Q171. What is the purpose of the electrolyte in a hydrogen fuel cell?

Q172. Why are hydrogen fuel cells considered more efficient than combustion engines?

Q173. How does temperature affect the efficiency of hydrogen fuel cells?

Q174. How does the size of the electrodes affect the performance of a fuel cell?

Q175. What safety precautions are needed when using hydrogen as a fuel?

Q176. In what ways are rechargeable cells more practical than hydrogen fuel cells?

Q177. In what ways are hydrogen fuel cells more practical than rechargeable batteries?

Q178. What factors affect the lifetime of a hydrogen fuel cell?

Q179. How can the cost of using hydrogen fuel cells be reduced?

Q180. Why is the infrastructure for hydrogen refuelling limited?

Q181. What are the half-equations at the electrodes in a hydrogen fuel cell?

Q182. How do you balance the half-equation for hydrogen oxidation in a fuel cell?

Q183. What happens at the positive electrode in a hydrogen fuel cell?

Q184. What happens at the negative electrode in a hydrogen fuel cell?

Q185. What ions move through the electrolyte in a hydrogen fuel cell?

Q186. Why are fuel cells described as redox reactions?

Q187. What is the difference between the anode and cathode in a hydrogen fuel cell?

Q188. Why is a constant fuel supply needed for a hydrogen fuel cell to keep working?

Q189. Why can hydrogen fuel cells be used in remote or off-grid locations?

Q190. What happens to the energy in the chemical bonds of hydrogen in a fuel cell?

Q191. Why is the use of hydrogen fuel cells in cars still limited?

Q192. How can the purity of hydrogen affect the operation of a fuel cell?

Q193. Why is it important that hydrogen fuel cells produce no carbon dioxide?

Q194. What is one reason hydrogen fuel cells are considered sustainable?

Q195. How does the design of the electrodes affect the efficiency of a hydrogen fuel cell?

Q196. What kind of emissions are produced by hydrogen fuel cells?

Q197. Why is the production of hydrogen from fossil fuels less environmentally friendly?

Q198. How do hydrogen fuel cells compare with lithium-ion batteries in terms of weight?

Q199. Why might cold temperatures affect hydrogen fuel cell vehicles?

Q200. What challenges must be overcome before hydrogen fuel cells can replace petrol engines?