MEGA LECTURE

AQA (GCSE Notes)

Chapter 3: Particle Model of Matter

Q1. Define the term density and write its formula.

Q2. How can you calculate the volume of a regular solid object?

Q3. Describe how to find the volume of an irregular solid object.

Q4. What apparatus would you use to measure the mass of a solid object?

Q5. How can a displacement method help in finding volume?

Q6. Explain why gases have lower densities than solids.

Q7. Describe how particles are arranged in a solid.

Q8. How does the particle arrangement in a liquid differ from that in a gas?

Q9. Why do solids have a higher density than gases?

Q10. What happens to the density of a substance if its volume increases but mass stays the same?

Q11. Describe how you would use a ruler to calculate the volume of a cube.

Q12. What is the importance of using the correct units in density calculations?

Q13. Explain how the particle model describes a change from liquid to gas.

Q14. What is meant by a physical change in terms of state changes?

Q15. Why is mass conserved when a substance changes state?

Q16. What happens to the mass of a substance when it melts?

Q17. Describe how to measure the density of a liquid using appropriate apparatus.

Q18. How do you ensure accuracy when measuring the volume of a liquid?

Q19. What is the relationship between particle spacing and density?

Q20. How would you use a micrometer to measure a small object's dimension?

Q21. Why is a Vernier calliper more accurate than a ruler?

MEGA LECTURE

Q22. What causes the volume of a substance to change when heated?

Q23. How does the particle model explain the process of freezing?

Q24. What physical property remains unchanged during a change of state?

Q25. Describe the motion of particles in a gas.

Q26. What is meant by the term 'sublimation'?

Q27. How can you show that evaporation is a physical change?

Q28. Explain the term 'conservation of mass' in simple words.

Q29. Why does ice float on water in terms of density?

Q30. How does boiling differ from evaporation?

Q31. How can a diagram show differences between solids, liquids, and gases?

Q32. Why do gases expand to fill their container?

Q33. What happens to particle energy during melting?

Q34. Why does the volume of a gas increase with temperature?

Q35. What safety precautions are needed when heating a liquid during an experiment?

Q36. Describe a method to compare densities of two different liquids.

Q37. Why must you use a balance with appropriate sensitivity for density experiments?

Q38. How does pressure relate to the particle movement in gases?

Q39. What are the limitations of using the particle model?

Q40. Describe how to draw a simple particle diagram of a solid.

Q41. How does the particle model explain condensation?

Q42. What changes when a solid becomes a liquid?

Q43. Why is it important to use the correct measuring instrument for each property?

Q44. How can you ensure your density measurement is reliable?

Q45. Describe how you would calculate the average density of several objects.

Q46. What does a high-density value tell you about a substance?

Q47. Why must the container's volume be subtracted when measuring the density of a liquid?

Q48. How does mass change when a liquid evaporates in a closed system?

Q49. Why are the properties of a material unchanged after a physical state change?

Q50. Explain how the density of an object can determine whether it sinks or floats in water.

Q51. What is internal energy in terms of particles in a system?

Q52. Name the two types of energy that make up internal energy.

Q53. How does heating affect the energy of particles in a system?

Q54. What happens to the temperature of a system when its internal energy increases?

Q55. What does specific heat capacity mean?

Q56. What is the unit of specific heat capacity?

Q57. How does the mass of a substance affect the temperature change when heated?

Q58. How can a change of state occur without a temperature rise?

Q59. What does the equation $\Delta E = mc\Delta\theta$ represent?

Q60. Write the full names for the symbols in the equation $\Delta E = mc\Delta\theta$.

Q61. What is the unit for thermal energy change in the equation $\Delta E = mc\Delta\theta$?

Q62. Describe what happens to particle movement when a substance is heated.

Q63. How does the type of material affect its temperature change when heated?

Q64. What happens to internal energy when a substance cools?

Q65. What role does potential energy play in internal energy?

Q66. What causes an increase in potential energy during heating?

Q67. How can you increase the internal energy of a system?

Q68. How can energy input raise the temperature without changing the state?

Q69. Why do some materials heat up faster than others?

MEGA LECTURE

Q70. How is specific heat capacity useful in everyday life?

Q71. What is the relationship between mass and thermal energy change?

Q72. Why does a higher mass require more energy to heat up?

Q73. Explain why metals have low specific heat capacity.

Q74. Describe a situation where heating changes the state but not the temperature.

Q75. What does $\Delta\theta$ represent in the thermal energy equation?

Q76. How can you calculate specific heat capacity from a heating experiment?

Q77. What happens to the internal energy when water boils?

Q78. If two objects are made of different materials, why might one heat up faster?

Q79. What happens to the energy supplied during melting or boiling?

Q80. How do you measure the temperature change in a system during heating?

Q81. How would doubling the mass affect the temperature change, if energy input stays the same?

Q82. Why does water take longer to heat up than metal?

Q83. How can the internal energy of a gas be increased without heating it?

Q84. What factors determine how much thermal energy is needed to heat a substance?

Q85. How does increasing temperature affect the kinetic energy of particles?

Q86. Give an example of when thermal energy increases but the temperature stays constant.

Q87. Why is it important to know the specific heat capacity of a substance in heating systems?

Q88. What is meant by thermal equilibrium in a system?

Q89. What happens to the internal energy during condensation?

Q90. How can a thermometer be used to find $\Delta\theta$ in a practical?

Q91. Why is more energy needed to heat a large pot of water than a small cup?

Q92. How can heat loss affect an experiment measuring specific heat capacity?

Q93. How does the specific heat capacity help in designing thermal storage systems?

Q94. What does a small specific heat capacity mean for temperature change?

Q95. Describe the effect of heating a substance with high specific heat capacity.

Q96. What is the difference between internal energy and thermal energy?

Q97. Why does temperature not change during a state change, even though energy is added?

Q98. How do kinetic and potential energy contribute to total internal energy?

Q99. Explain why ice requires energy to melt, even at 0°C.

Q100. Why does internal energy increase even if the temperature does not?

Q101. What is meant by latent heat in terms of particle energy?

Q102. Why does temperature stay constant during a change of state?

Q103. Define specific latent heat in simple terms.

Q104. What is the correct unit of specific latent heat?

Q105. State the equation used to calculate energy during a change of state.

Q106. What is meant by specific latent heat of fusion?

Q107. What is meant by specific latent heat of vaporisation?

Q108. What type of energy is involved when a substance melts?

Q109. What energy transfer occurs during boiling?

Q110. Why is energy still needed to melt ice even at 0°C?

Q111. What happens to the internal energy of a substance during freezing?

Q112. In the equation E = mL, what does the letter L represent?

Q113. In the equation E = mL, what does the letter m represent?

Q114. In the equation E = mL, what does the letter E represent?

Q115. What happens to the arrangement of particles during condensation?

Q116. Give one difference between specific latent heat and specific heat capacity.

Q117. During vaporisation, why doesn't the temperature rise even when energy is added?

Q118. How does adding energy during a change of state affect the bonds between particles?

Q119. Define internal energy during a state change in terms of particles.

Q120. What is one method of measuring the latent heat of fusion of water?

Q121. Why is no temperature rise observed while a substance is melting?

Q122. A sample of ice is melting. How can you calculate the energy used?

Q123. Why does evaporation from the skin cause a cooling effect?

Q124. Describe the change in motion of particles during boiling.

Q125. What kind of energy do particles gain during melting?

Q126. What information can you obtain from a heating curve?

Q127. What does a flat section on a heating curve graph represent?

Q128. How does the energy required for vaporisation compare to fusion?

Q129. How does mass affect the energy required for a change of state?

Q130. List two safety precautions for a latent heat practical.

Q131. Which units would you use for energy in a latent heat calculation?

Q132. Why do different substances have different values of latent heat?

Q133. What happens to potential energy during the melting process?

Q134. Why is more energy needed to vaporise a liquid than to melt a solid?

Q135. Describe what happens to particles at the boiling point of a liquid.

Q136. Explain why your skin feels cold after alcohol evaporates from it.

Q137. How can you calculate specific latent heat from experiment data?

Q138. On a heating graph, what does the flat part during boiling represent?

Q139. Explain how latent heat is related to internal energy.

Q140. What happens to particle spacing during vaporisation?

Q141. Describe the motion of gas particles in a sealed container.

Q142. How is the temperature of a gas linked to its kinetic energy?

Q143. What happens to gas pressure when temperature increases at constant volume?

Q144. Why does faster movement of gas particles increase pressure?

Q145. How does temperature affect the average speed of gas molecules?

Q146. What is meant by random motion in gases?

Q147. Why does a rise in temperature increase pressure in a gas at constant volume?

Q148. Describe how gas particles exert pressure on the walls of a container.

Q149. What effect does cooling have on the pressure of a fixed volume of gas?

Q150. How would you describe the particle movement of a gas at a higher temperature?

Q151. What is the effect on gas pressure when the gas is compressed at constant temperature?

Q152. Explain why gas pressure decreases when volume increases at constant temperature.

Q153. State the equation that links gas pressure and volume for a fixed mass at constant temperature.

Q154. If pressure increases, what must happen to volume for temperature to remain constant?

Q155. Describe how gas particles create pressure on the walls of a container.

Q156. What unit is used to measure pressure in gas laws?

Q157. What unit is used to measure volume in gas laws?

Q158. Why does compressing a gas increase its pressure?

Q159. How does increasing the volume of a gas container affect particle collisions?

Q160. What does the equation pV = constant assume about the temperature of the gas?

Q161. Explain what is meant by a gas being “compressed.”

Q162. What is meant by the term "constant temperature" in relation to the pV equation?

Q163. How does the particle model explain changes in pressure with volume?

Q164. Why do gases exert pressure on the walls of their containers?

Q165. What would happen to the pressure of a gas if its volume is halved at constant temperature?

Q166. What happens to the pressure of a gas if the volume doubles and temperature stays the same?

Q167. Describe how a gas can be compressed in a laboratory setting.

Q168. How does the frequency of particle collisions change when volume is decreased?

Q169. What effect does increasing pressure have on the shape of a flexible gas container?

Q170. What is meant by the term "net force at right angles to the wall" in gas pressure?

Q171. What assumption is made about the gas particles in the particle model?

Q172. If volume remains the same, what must happen to pressure for pV to remain constant?

Q173. How can the pressure of a gas be measured practically?

Q174. Why is it important to keep temperature constant when investigating pressure and volume?

Q175. State one example of a real-life device where gas pressure increases due to compression.

Q176. What is meant by “work is done on a gas”?

Q177. Give an example where doing work on a gas increases its temperature.

Q178. What is the energy transfer involved when a gas is compressed?

Q179. Why does compressing a gas increase its internal energy?

Q180. Describe how a bicycle pump demonstrates gas compression and temperature increase.

Q181. What happens to the temperature of a gas when it is compressed quickly?

Q182. Explain how doing work on a gas can increase its internal energy without heating.

Q183. How does the particle model explain an increase in temperature during compression?

Q184. What happens to the motion of gas particles when work is done on the gas?

Q185. State one safety consideration when compressing gases.

Q186. What is meant by the internal energy of a gas?

Q187. Explain how volume and pressure are related if temperature and mass stay constant.

Q188. What happens to gas particles during a rapid compression?

Q189. Why does a sealed syringe become harder to push as it is compressed?

Q190. What is the role of kinetic energy in determining gas pressure?

Q191. What happens to pressure if the volume of a gas is reduced to one-third at constant temperature?

Q192. How does temperature rise when a gas is compressed without losing energy?

Q193. What is the relationship between volume and pressure according to Boyle's Law?

Q194. Explain how gas pressure is affected in a scuba tank during compression.

Q195. What does it mean when we say gas pressure acts "at right angles" to the wall?

Q196. In terms of particles, explain why a gas exerts more pressure in a smaller container.

Q197. Describe how the internal energy of a gas changes when it is compressed in a pump.

Q198. If pV = constant, what happens to pressure if volume is decreased?

Q199. Why does compressing air in a container make it feel warmer?

Q200. What must remain constant for pV = constant to apply accurately?