



Class 9 Science Chapter 5 – Important Questions



Exploring Mixtures and their Separation



New NCERT *Exploration* | 2026–27

These questions are based on the **new Chapter 5**. The chapter covers **homogeneous and heterogeneous mixtures, solutions, suspensions, colloids, concentration, solubility, crystallisation, distillation, chromatography, separating funnel, sublimation, centrifugation, coagulation and the Tyndall effect**.



SECTION A – VERY SHORT ANSWER QUESTIONS

1. What is a mixture?
2. What is a homogeneous mixture?
3. What is a heterogeneous mixture?
4. Give one example of a homogeneous mixture.
5. Give one example of a heterogeneous mixture.
6. What is a solution?
7. What is a solute?
8. What is a solvent?
9. What is a suspension?
10. What is a colloid?

11. What is concentration of a solution?

12. What is solubility?

13. What is a saturated solution?

14. What is crystallisation?

15. What is distillation?

16. What is chromatography?

17. What is sublimation?

18. What is centrifugation?

19. What is coagulation?

20. What is the Tyndall effect?



SECTION B – HOMOGENEOUS & HETEROGENEOUS MIXTURES

21. Differentiate between homogeneous and heterogeneous mixtures.

22. Why is a salt solution considered a homogeneous mixture?

23. Why is muddy water a heterogeneous mixture?

24. Give three examples each of homogeneous and heterogeneous mixtures.

25. How can you identify whether a mixture is homogeneous or heterogeneous?

26. Are all mixtures physically separable? Explain.

27. Why do different components of a mixture retain their individual properties?
28. How are mixtures different from pure substances?
29. Why can the composition of a mixture vary?
30. Give examples of mixtures that are commonly encountered in everyday life.
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SECTION C – SOLUTIONS

31. What are the components of a solution?
32. Differentiate between solute and solvent.
33. Give an example of a solid dissolved in a liquid.
34. Give an example of a liquid dissolved in a liquid.
35. Give an example of a gas dissolved in a liquid.
36. Why is a solution called a homogeneous mixture?
37. What happens when more solute is added to a solution?
38. What is meant by a saturated solution?
39. What is an unsaturated solution?
40. What factors can affect the solubility of a substance?
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SECTION D – CONCENTRATION OF SOLUTIONS

41. What is meant by concentration?
 42. What is mass by mass percentage?
 43. Write the formula for mass by mass percentage.
 44. What is mass by volume percentage?
 45. Write the formula for mass by volume percentage.
 46. What is volume by volume percentage?
 47. Write the formula for volume by volume percentage.
 48. Why is concentration useful in describing a solution?
 49. How can two solutions of the same substances have different concentrations?
 50. What happens to the concentration when more solvent is added?
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SECTION E – CONCENTRATION NUMERICALS

51. A solution contains 10 g of salt and 90 g of water. Calculate the mass by mass percentage of salt.
52. A solution contains 20 g of sugar in 100 g of solution. Calculate the mass by mass percentage.
53. 15 g of salt is dissolved to make 150 mL of solution. Calculate the mass by volume percentage.
54. A solution contains 25 mL of alcohol in 100 mL of solution. Calculate the volume by volume percentage.

55. A solution contains 30 g of glucose in 200 g of solution. Calculate its mass by mass percentage.
56. A solution is prepared by dissolving 5 g of a substance in enough water to make 250 mL of solution. Calculate its mass by volume percentage.
57. A solution has a concentration of 10% by mass. How much solute is present in 200 g of solution?
58. A solution contains 15% solute by mass. Calculate the mass of solute present in 500 g of solution.

The new syllabus specifically requires students to **define and calculate concentration using mass-by-mass, mass-by-volume and volume-by-volume percentages.**



SECTION F – SOLUBILITY

59. What is solubility?
60. What is meant by a saturated solution?
61. How does temperature generally affect the solubility of many solids in water?
62. Why does sugar dissolve more readily in hot water?
63. How can a solubility graph be used?
64. What information can be obtained from a solubility curve?
65. Why is solubility important in crystallisation?
66. How does cooling help in obtaining crystals from a solution?
67. Why may some substances show a decrease in solubility with increasing temperature?
68. How can you compare the solubility of two substances using a graph?

The syllabus specifically requires students to **analyse solubility graphs** and **explain how solubility changes with temperature**.



SECTION G – SUSPENSIONS

- 69. What is a suspension?**
 - 70. What are the characteristics of suspension particles?**
 - 71. Why do suspension particles settle on standing?**
 - 72. Can suspension particles be separated by filtration?**
 - 73. Give three examples of suspensions.**
 - 74. Why is muddy water a suspension?**
 - 75. How is a suspension different from a solution?**
 - 76. Why are suspensions considered heterogeneous mixtures?**
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SECTION H – COLLOIDS

- 77. What is a colloid?**
- 78. What are the two components of a colloid?**
- 79. What is the dispersed phase?**
- 80. What is the dispersion medium?**
- 81. Give three examples of colloids.**
- 82. Why do colloidal particles not settle easily?**

83. What is the Tyndall effect?

84. Why does a colloid show the Tyndall effect?

85. Why does a true solution generally not show the Tyndall effect?

86. Differentiate between solution, suspension and colloid.

87. Why can milk be considered a colloid?

88. Why are colloids important in everyday life?

The textbook identifies light scattering by dispersed particles in colloids and suspensions as the **Tyndall effect**.



SECTION I – SOLUTION vs SUSPENSION vs COLLOID

89. Compare solutions, suspensions and colloids on the basis of:

- Particle size
- Visibility of particles
- Settling
- Filtration
- Tyndall effect
- Homogeneity

90. A mixture appears uniform but scatters a beam of light. What type of mixture could it be? Explain.

91. A mixture contains particles that settle on standing. Identify the type of mixture.

92. A mixture does not settle and does not scatter light. What type of mixture is it likely to be?

93. Why is milk not considered a true solution?

94. Why is muddy water not a colloid?

SECTION J – SEPARATION TECHNIQUES

95. Why do we need to separate mixtures?

96. What properties of substances can be used for separation?

97. What is filtration?

98. What is sedimentation?

99. What is decantation?

100. What is evaporation?

101. What is crystallisation?

102. What is distillation?

103. What is fractional distillation?

104. What is paper chromatography?

105. What is a separating funnel?

106. What is sublimation?

107. What is centrifugation?

108. What is coagulation?

SECTION K – CRYSTALLISATION

109. What is crystallisation?
110. Why is crystallisation used to obtain pure solids?
111. How is crystallisation different from evaporation?
112. Why are crystals formed when a hot saturated solution is cooled?
113. Why is crystallisation often preferred over simple evaporation?
114. Give one example where crystallisation is useful.
115. Explain the steps involved in obtaining crystals from a saturated solution.

The chapter describes crystallisation as a method for obtaining a **pure solid from its saturated solution**.



SECTION L – DISTILLATION

116. What is distillation?
117. What physical property is used in distillation?
118. How can distillation separate a liquid from dissolved solids?
119. How can distillation separate two miscible liquids?
120. Why is the difference in boiling points important?
121. What is the role of the condenser in distillation?
122. What is the distillate?
123. Draw and label a simple distillation apparatus.
124. Differentiate between evaporation and distillation.

125. When would you prefer distillation over evaporation?

The textbook states that distillation can separate **two miscible liquids when their boiling points differ sufficiently** and can also obtain a liquid from a liquid-solid mixture.



SECTION M – PAPER CHROMATOGRAPHY

126. What is paper chromatography?

127. What principle is used in paper chromatography?

128. Why can different pigments travel different distances on paper?

129. How can chromatography show that a coloured substance contains several components?

130. Give an example of the use of paper chromatography.

131. How can paper chromatography be used to separate pigments from leaves?

132. Draw a simple labelled diagram of paper chromatography.

The textbook specifically suggests using chromatography to investigate whether red leaves contain green pigments and to separate components of food colours.



SECTION N – SEPARATING FUNNEL

133. What is a separating funnel?

134. Which property is used to separate liquids using a separating funnel?

135. What are immiscible liquids?

136. Give an example of two immiscible liquids.
137. How can oil and water be separated using a separating funnel?
138. Which layer comes out first from the separating funnel?
139. Why do the two liquids form separate layers?
140. Draw and label a separating funnel.

The textbook explains that a separating funnel is used for **two immiscible liquids with different densities**.



SECTION O – SUBLIMATION

141. What is sublimation?
142. What is deposition?
143. Give examples of substances that undergo sublimation.
144. How can sublimation be used to separate a mixture?
145. Why is sublimation useful for separating certain solids?
146. Differentiate between sublimation and evaporation.
147. What happens to the vapour during deposition?

The chapter defines sublimation as the direct change of a solid into vapour without passing through the liquid state, and deposition as the reverse process.



SECTION P – CENTRIFUGATION & COAGULATION

148. What is centrifugation?
149. What principle is used in centrifugation?
150. Why does rapid spinning help separate components?
151. Give one use of centrifugation in daily life or medicine.
152. What is coagulation?
153. What is a coagulant?
154. How does coagulation help separate particles from water?
155. Why is coagulation useful in sewage or water treatment?
156. How is centrifugation different from filtration?

The textbook explains that centrifugation uses **rapid spinning** to separate heavier particles, while coagulation causes smaller particles to clump together and settle.

SECTION Q – APPLICATION-BASED QUESTIONS

157.  A mixture contains sand and water.

- a) Is it homogeneous or heterogeneous?
 - b) Which separation method would you use?
 - c) Why is that method suitable?
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158.  A mixture contains common salt and water.

- a) How would you obtain salt?
 - b) How would you obtain pure water instead?
 - c) Which method is suitable for each purpose?
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159. 🧪 A mixture contains oil and water.

- a) Are the liquids miscible?
 - b) Which method should be used?
 - c) Which property makes the separation possible?
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160. 🎨 A black ink appears to be a single substance.

After paper chromatography, several coloured spots are obtained.

- a) What does this show?
 - b) Why do the components travel different distances?
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161. ❄️ A mixture contains naphthalene and sand.

- a) Which method can be used?
 - b) Why is this method suitable?
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162. 💧 A solution contains a dissolved solid and you need to obtain the solid in pure crystalline form.

- a) Which method would you choose?
 - b) Why?
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SECTION R – COMPETENCY-BASED QUESTIONS

163. 🌊 Case Study – Water Purification

Muddy water is allowed to stand. A substance is then added to make the suspended particles clump together and settle. The water is then filtered.

Answer:

- a) What is sedimentation?
- b) What is coagulation?
- c) What is the role of the coagulant?
- d) Why is filtration used afterwards?

The chapter connects **sedimentation, coagulation and filtration** with sewage and water treatment.

164. Case Study – Milk

Milk appears uniform to the naked eye but scatters a beam of light.

- a) What type of mixture is milk?
 - b) What is the Tyndall effect?
 - c) Why does milk show this effect?
 - d) Why is milk not a true solution?
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165. Case Study – Salt Solution

A student dissolves 20 g salt in water to prepare 200 g of solution.

- a) Calculate the mass by mass percentage.
 - b) Identify the solute.
 - c) Identify the solvent.
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166. Case Study – Two Liquids

Two miscible liquids have boiling points of 60°C and 90°C.

- a) Which separation technique would be appropriate?
- b) What property is used?
- c) Why is the boiling-point difference important?

The textbook includes a problem involving two miscible liquids with boiling points of **60°C and 90°C** and asks students to suggest a suitable separation method.



SECTION S – HIGHER-ORDER THINKING QUESTIONS

- 167. Why can't a mixture be separated by a single method in every situation?**
- 168. Why should the physical properties of the components be considered before choosing a separation technique?**
- 169. Why is filtration unsuitable for separating salt from salt solution?**
- 170. Why is evaporation unsuitable when you want to collect the solvent?**
- 171. Why is distillation better than evaporation when both the solute and solvent are required?**
- 172. Why can two immiscible liquids be separated using a separating funnel?**
- 173. Why does a true solution not show the Tyndall effect?**
- 174. Why can colloidal particles remain suspended for a long time?**
- 175. Why does increasing temperature often increase the solubility of solids?**
- 176. Why does crystallisation produce purer solids than simple evaporation in many cases?**
- 177. Why can chromatography separate substances that appear to be uniformly mixed?**
- 178. Why is centrifugation useful for separating components that cannot easily be separated by ordinary settling?**
- 179. Why are separation techniques important for environmental protection?**

180. How are separation techniques used in medicine and healthcare?

SECTION T – LONG ANSWER QUESTIONS

181. Explain the difference between homogeneous and heterogeneous mixtures with examples.

182. Explain solutions, suspensions and colloids and compare their properties.

183. Explain concentration of solutions and the three percentage methods used to express concentration.

184. Explain solubility and discuss the effect of temperature on solubility.

185. Explain crystallisation and describe how pure crystals can be obtained from a solution.

186. Explain the principle and procedure of distillation.

187. Explain paper chromatography and its applications.

188. Explain the working of a separating funnel with a labelled diagram.

189. Explain sublimation and deposition with suitable examples.

190. Explain centrifugation and coagulation and give their applications.

191. Explain the Tyndall effect and distinguish between a solution, colloid and suspension.

192. Explain how different separation techniques are selected according to the physical properties of the components.

MOST IMPORTANT QUESTIONS FOR EXAM

If students have limited time, prepare these **first**:

- ★ 1. Differentiate between homogeneous and heterogeneous mixtures.
 - ★ 2. Differentiate between solution, suspension and colloid.
 - ★ 3. What is the Tyndall effect? Explain with an example.
 - ★ 4. Define solute, solvent and solution.
 - ★ 5. Explain concentration and its three percentage forms.
 - ★ 6. Solve numerical problems based on mass-by-mass percentage.
 - ★ 7. Solve numerical problems based on mass-by-volume percentage.
 - ★ 8. Explain solubility and the effect of temperature on it.
 - ★ 9. Explain crystallisation and its advantages.
 - ★ 10. Explain distillation with a labelled diagram.
 - ★ 11. Explain paper chromatography and its applications.
 - ★ 12. Explain separation using a separating funnel.
 - ★ 13. Explain sublimation with an example.
 - ★ 14. Explain centrifugation and coagulation.
 - ★ 15. Choose suitable separation methods for different mixtures and give reasons.
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IMPORTANT FORMULAS

Mass by Mass Percentage

Mass by mass percentage = $(\text{Mass of solute} / \text{Mass of solution}) \times 100$

Mass by Volume Percentage

Mass by volume percentage = (Mass of solute / Volume of solution) × 100

Volume by Volume Percentage

Volume by volume percentage = (Volume of solute / Volume of solution) × 100

Remember

Mass of solution = Mass of solute + Mass of solvent

QUICK REVISION BOX

 **Mixture** → Two or more substances physically combined

 **Homogeneous mixture** → Uniform composition

 **Heterogeneous mixture** → Non-uniform composition

 **Solution** → Homogeneous mixture

 **Solute** → Substance dissolved

 **Solvent** → Substance that dissolves the solute

 **Suspension** → Heterogeneous mixture with particles that can settle

 **Colloid** → Dispersed particles that generally do not settle easily

 **Tyndall effect** → Scattering of light by dispersed particles

 **Crystallisation** → Obtaining pure crystals from a saturated solution

 **Distillation** → Separation based mainly on differences in boiling points

 **Chromatography** → Separation based on different rates of movement

 **Separating funnel** → Separates immiscible liquids based on density

 **Sublimation** → Solid → vapour directly

 **Centrifugation** → Separation using rapid spinning

 **Coagulation** → Small particles clump together and settle

The textbook's chapter summary highlights these same separation principles and their applications.



TOP 10 DIAGRAMS / ACTIVITIES TO PRACTISE

1.  **Crystallisation apparatus/process**
2.  **Simple distillation apparatus**
3.  **Paper chromatography**
4.  **Separating funnel**
5.  **Sublimation setup**
6.  **Centrifugation setup**
7.  **Tyndall effect**
8.  **Solubility curve**
9.  **Classification of mixtures flowchart**
10.  **Water purification/separation flowchart**



Exam Tip

For every "choose the separation method" question, write:

Mixture → Property used → Separation method → Reason

For example:

Oil + water → Different densities + immiscibility → Separating funnel → The liquids form separate layers.

This matches the chapter's emphasis on selecting separation techniques according to the **physical properties of the components**.