

# CHEMISTRY QUESTIONS FOR CLASS 9

## (Solved Intext and Exercise Questions)

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### Chapter 2: Is Matter Around Us Pure

9. Classify the following as physical or chemical changes:

- Cutting of trees
- Melting of butter in a pan
- Rusting of almirah
- Boiling of water to form steam
- Passing of electric current through water and water breaking into hydrogen and oxygen gases.
- Dissolving common salt in water
- Making a fruit salad with raw fruits, and
- Burning of paper and wood

Solution: The following is the classification into physical and chemical change

Physical change	Chemical change
<ul style="list-style-type: none"><li>• Cutting the trees</li><li>• Boiling of water to form steam</li><li>• Melting of butter in a pan</li><li>• Making a fruit salad with raw fruits</li><li>• Dissolving common salt in water</li></ul>	<ul style="list-style-type: none"><li>• Rusting of almirah</li><li>• Passing of electric current through water, and water breaking into hydrogen and oxygen gases</li><li>• Burning of paper and wood</li></ul>

10. Try segregating the things around you as pure substances and mixtures.

Solution: Listed below are the classifications based on pure substances and mixtures:

Pure substance	Mixture
Water	Soil
Salt	Salad
Iron	Air
Diamond	Steel

**11. Which separation techniques will you apply for the separation of the following?**

- (a) Sodium chloride from its solution in water.**
- (b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.**
- (c) Small pieces of metal in the engine oil of a car.**
- (d) Different pigments from an extract of flower petals.**
- (e) Butter from curd.**
- (f) Oil from water.**
- (g) Tea leaves from tea.**
- (h) Iron pins from sand.**
- (i) Wheat grains from husk.**
- (j) Fine mud particles suspended in water.**

Solution:

- (a) In water, sodium chloride in its solution can be separated through the process of Evaporation.
- (b) The technique of sublimation is apt as Ammonium chloride supports Sublimation.
- (c) Tiny chunks of metal pieces in engine oil of car can be manually filtered.
- (d) Chromatography can be used for the fine segregation of various pigments from an extract of flower petals.
- (e) The technique of centrifugation can be applied to separate butter from curd. It is based on the concept of difference in the density.
- (f) To separate oil from water which are two immiscible liquids which vary in their densities, separating funnel can be an effective method.
- (g) Tea leaves can be manually separated from tea using simple filtration methods.
- (h) Iron pins can be separated from sand either manually or with the use of magnets as the pins exhibit strong magnetic quality which can be a key characteristic hence taken into consideration.
- (i) The differentiating property between husk and wheat is that there is a difference in their mass. If treated with a small amount of wind energy, a remarkable variation in the moving distance is noticed. Hence to separate them, the sedimentation/winnowing procedure can be applied.
- (j) Due to the property of water, sand or fine mud particles tends to sink in the bottom as it is denser provided they are undisturbed. Through the process of sedimentation/decantation water can be separated from

fine mud particles as the technique is established on obtaining clear water by tilting it out.

**12. Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate, and residue.**

Solution:

- (a) Into a vessel, add a cup of milk which is the solvent, supply it with heat.
- (b) Add tea powder or tea leaves to the boiling milk, which acts as a solute. Continue to heat
- (c) The solute i.e., the tea powder remains insoluble in the milk which can be observed while it is still boiling.
- (d) At this stage, add some sugar to the boiling solution while stirring
- (e) Sugar is a solute but is soluble in the solvent
- (f) Continuous stirring causes the sugar to completely dissolve in the tea solution hence reaching saturation.
- (g) Once the raw smell of tea leaves is vanished and tea solution is boiled enough, take the solution off the heat, filter or strain it to separate tea powder and the tea solution. The insoluble tea powder remains as a residue while the solute (sugar) and the solvent (essenced milk solution) strain through the filter medium which is collected as the filtrate.

**13. Pragma tested the solubility of three different substances at different temperatures and collected the data as given below (results are given in the following table, as grams of a substance dissolved in 100 grams of water to form a saturated solution).**

Substance dissolved	Temperature in K				
	283	293	313	333	353
	Solubility				
Potassium nitrate	21	32	62	106	167
Sodium chloride	36	36	36	37	37
Potassium chloride	35	35	40	46	54
Ammonium chloride	24	37	41	55	66

- (a) What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313K?
- (b) Pragma makes a saturated solution of potassium chloride in water at 353 K and leaves the solution to cool at room temperature. What would she observe as the solution cools? Explain.

**(c) Find the solubility of each salt at 293 K. Which salt has the highest solubility at this temperature?**

**(d) What is the effect of change of temperature on the solubility of a salt?**

Solution:

**(a) Given:**

Mass of potassium nitrate required to produce a saturated solution in 100 g of water at 313 K = 62g

To find:

Mass of potassium nitrate required to produce a saturated solution in 50 g of water =?

Required amount =  $62 \times 50/100 = 31$

Hence 31 g of potassium nitrate is required.

**(b)** The solubility of potassium chloride in water is decreased when a saturated solution of potassium chloride loses heat at 353 K. Consequently, Pragma would observe crystals of potassium chloride which would have surpassed its solubility at low temperatures.

**(c)** Listed below is the solubility of each salt at 293 K:

- Solubility of Potassium nitrate  $\rightarrow 32/100$
- Solubility of Sodium chloride  $\rightarrow 36/100$
- Solubility of Potassium chloride  $\rightarrow 35/100$
- Solubility of Ammonium chloride  $\rightarrow 37/100$

It is observed that the ammonium chloride salt has the highest amount of solubility when compared to any other salt at 293 K.

**(d)** Effect of change of temperature on the solubility of salts:

The table clearly depicts that the solubility of the salt is dependent upon the temperature and increases with an increase in temperature. With this we can infer that when a salt arrives at its saturation point at a specific temperature, there is a propensity to dissolve more salt through an increase in the temperature of the solution.

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