



Subject: Chemistry

CYCLE 1

Class IX

Name of Chapter: Is matter around us pure

3 <sup>rd</sup> WEEK (19th to 24th April 2021)	
1st Period: Pg: 16	
<b>Step 1</b>	Study the following topic from the textbook: <ul style="list-style-type: none"><li>• 2.2.1 Concentration of a solution</li><li>• Activity 2.3</li></ul>
<b>Step 2</b>	Study the same topic in the Extramark app: Chapter 2: Is matter around us pure → Detailed learning → Understanding concepts
<b>Step 3</b>	Clear your doubts (if any) from the subject teacher.
<b>Step 4</b>	Revise using following Bullet points: <ul style="list-style-type: none"><li>• The concentration of a solution is the amount (mass or volume) of solute present in a given amount (mass or volume) of the solution. Also, the amount of solute dissolved in a given mass or volume of solvent is called concentration of solution i.e. <math display="block">\text{Concentration of solution} = \frac{\text{Amount of solute}}{\text{Amount of solution}}</math> or <math display="block">= \frac{\text{Amount of solute}}{\text{Amount of solvent}}</math></li></ul> <p>(i) Mass by mass percentage of a solution <math display="block">= (\text{Mass of solute} / \text{Mass of solution}) \times 100</math></p> <p>(ii) Mass by volume percentage of a solution <math display="block">= (\text{Mass of solute} / \text{Volume of solution}) \times 100</math></p>

(iii) Volume by volume percentage of a solution

$$= (\text{Volume of solute} / \text{Volume of solution}) \times 100$$

**Step 5** Solve the questions as below:

Write the following Questions/Answers in Chemistry Class Work Copy

Q1. A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.

Ans:

Mass of solute (salt) = 40 g

Mass of solvent (water) = 320 g

We know,

Mass of solution = Mass of solute + Mass of solvent

$$= 40 \text{ g} + 320 \text{ g} = 360 \text{ g}$$

Mass percentage of solution = (Mass of solute / Mass of solution)  $\times$  100

$$= (40/360) \times 100 = 11.1\%$$

Q2: The teacher instructed three students 'A', 'B' and 'C' respectively to prepare a 50% (mass by volume) solution of sodium hydroxide (NaOH). 'A' dissolved 50g of NaOH in 100 mL of water. 'B' dissolved 50g of NaOH in 100g of water while 'C' dissolved 50g of NaOH in water to make 100 mL of solution. Which one of them has made the desired solution and why?

Answer:

In the given question, student 'C' has made it correctly because 50% (mass by volume) means 50 g of solute for every 100 mL of solution and not in 100 mL of solvent.

Mass by volume percentage of a solution

$$= (\text{Mass of solute} / \text{Volume of solution}) \times 100$$

$$= (50/100) \times 100 = 50\%$$

Student 'A' dissolved 50 g of NaOH in 100 mL of water (solvent) which is incorrect.

	Student 'B' dissolved 50 g of NaOH in 100 g of water (solvent), which is incorrect.
<b>End of 1st Period</b>	

<b>2nd period : Pg: 16-17</b>	
<b>Step 1</b>	Study the following topic from textbook: <ul style="list-style-type: none"> <li>• 2.2.1 Concentration of a solution continued</li> </ul>
<b>Step 2</b>	Study the same topic in the Extramark app: Chapter 2: Is matter around us pure → Detailed learning → Understanding concepts
<b>Step 3</b>	Clear your doubts (if any) from the subject teacher.
<b>Step 4</b>	Revise using following Bullet points: <ul style="list-style-type: none"> <li>• A solution in which the concentration of the solute is much less than that of the solvent is called <b>Dilute Solution</b>.</li> <li>• The solution having large amount of solute is called <b>Concentrated Solution</b>.</li> <li>• <b>Saturated Solution</b> – A solution in which no more quantity of solute can be dissolved at a given temperature. Saturated solution contains maximum amount of solute which can be dissolved in it at a given temperature.</li> <li>• If we keep on adding the solute in a solution there comes a point when no more solute dissolves in the solution. This is called the <b>Saturation Point of a Solution</b>.</li> <li>• <b>Unsaturated Solution</b> – A solution in which more quantity of solute can be dissolved at a given temperature.</li> </ul>
<b>Step 5</b>	<u>Solve the questions as below:</u> <u>Write the following Questions/Answers in Chemistry Class Work Copy</u>

	<p>Q1: To make a saturated solution, 36 g of sodium chloride is dissolved in 100 g of water at 293 K. Find its concentration at this temperature.</p> <p><b>Answer:</b></p> <p>Mass of solute (sodium chloride) = 36 g (Given)</p> <p>Mass of solvent (water) = 100 g (Given)</p> <p>Then, mass of solution = Mass of solute + Mass of solvent = (36 + 100) g</p> <p style="text-align: center;">= 136 g</p> <p>Therefore, concentration (mass by mass percentage) of the solution</p> <p style="text-align: center;">= (Mass of solute/Mass of solution) X 100</p> <p style="text-align: center;">= (36/136) X 100 = 26.4%</p>
<b>End of 2nd Period</b>	

<b>3rd period : Pg: 16-17</b>	
<b>Step 1</b>	<p>Study the following topic from textbook:</p> <p>2.2.1 Concentration of a solution continued</p>
<b>Step 2</b>	<p>Study the same topic in the Extramark app:</p> <p>Chapter 2: Is matter around us pure → Detailed learning → Understanding concepts</p>
<b>Step 3</b>	<p>Clear your doubts (if any) from the subject teacher.</p>
<b>Step 4</b>	<p>Revise using following Bullet points:</p> <ul style="list-style-type: none"> <li>• <b>Solubility</b> - The maximum amount of a solute present in a saturated solution at a particular temperature is called its solubility.</li> <li>• <b>Effect of the temperature on solubility:</b> The relationship between increase in temperature and solubility is that the solubility is directly proportional to the increase in the temperature. i.e. At high temperature the solubility of a</li> </ul>

solution is high so it is able to dissolve more solute, but when it is cooled, the solubility of the solution decreases and due to which the solute separate out as solid.

- If a saturated solution at particular temperature is heated to a higher temperature, then it becomes unsaturated. This is because the solubility of solute increases on heating and more of solute can be dissolved on raising the temperature of the solution.
- If a saturated solution is cooled to lower temperature then some of its dissolved solute will separate out in the form of solid crystals. This is because the solubility of solute in the solution decreases on cooling.

**Step 5** Solve the questions as below:

Write the following Questions/Answers in Chemistry Class Work Copy

Q1: Pragya 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 substance dissolved in 100 grams of water to form a saturated solution).

Substance Dissolved	Temperature in K				
	283	293	313	333	353
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 313 K?

Ans: At 313 K, Potassium nitrate for saturated solution of 100 grams of water = 62 g

∴ Potassium nitrate for saturated solution of 50 grams of water = 31 g

(b) Pragya 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.

Ans: Some amount of dissolved Potassium Chloride will reappear as undissolved solid as solubility of solute decreases with the decrease of temperature.

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

Ans: Solubility of each salt at 293 K are as follows:

- Potassium nitrate 32
- Sodium chloride 36
- Potassium chloride 35
- Ammonium chloride 37

Ammonium chloride salt has the highest solubility at this temperature.

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

Ans: Solubility of salt increases with the increase in temperature.

**End of 3rd Period**

#### QUESTIONS FOR SELF ASSESSMENT

Q1: Define solubility. How does solubility of a solid in water change with temperature?

Q2: A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution.

Q3: Calculate the mass of sodium sulphate required to prepare its 20% (mass percent) solution in 100 g of water.

Q4: What is meant by concentration of a solution?

Q5: What do you understand by the statement 'the solubility of NaCl is 36.5 g at room temperature'.