

Pre-Content/Content Post Content	Learning Outcomes/ Objectives	
	General	Specific
<u>Pre Content</u> Students know that pure and impure substances for common man means free from adulteration or free from impurities. Eg: Ghee, oil, milk. <u>Content</u> • Classification of matter • Classification of Pure and Impure substances • Types of mixtures - Solution - Suspension - colloid • concentration of a solution • Separating the components of a mixture • Physical and Chemical Changes <u>Post-Content</u> recapitulate the chapter through a flowchart and revise principles of all important separating techniques with examples	Students will be able to: • identify pure substances in the eyes of a scientist or chemist • classify matter into Pure substance and Mixtures • classify Pure substances into Elements and Compounds • classify Impure substances into Homogeneous and Heterogeneous Mixtures • list the properties of solution, suspension and colloid • identify a solution and its components • define concentration of a solution • analyze the procedure followed while separating a given type of mixture • differentiate between physical and chemical change • list examples and important principles	Students will be able to: • discover that a pure substance is made up of one kind of particles that is atoms/molecules. • compare pure and impure substances • identify pure and impure substances • list pure substances: elements and compounds • list the two types of mixtures and differentiate between them - Homogenous: true solutions - Heterogeneous: colloids and suspension • compare and identify different types of mixtures on the basis of their characteristic properties. • differentiate between a saturated and unsaturated solution • calculate the concentration of a solution • propose the underlying principle of the following techniques: • centrifugation • chromatography • sublimation • separating funnel • simple distillation • fractional distillation • separation of components of air • crystallization • identify a change as physical/chemical • solve problem based questions

Home Work / Assignments

- NCERT exercise questions
- Worksheets from assignment booklet

Teacher's Activity	Student's Activity	Teacher's Observation and Remedial action taken
Teacher will: explain the concept of “pure” by showing various examples in the class like milk, ghee, soil etc. and asking them about what they know about purity? explain the difference between mixture and compound through a video: explain the difference between solution, colloid and suspension through a video: explain the concept of saturated, unsaturated and supersaturated solution through a video: explain the separating techniques through the video: <u>ANNEXURE 2A</u> demonstrate the process of chromatography (Integration of Art) explain separation of components of air with the help of diagram given in NCERT book <u>ANNEXURE 2B</u> demonstrate the process of crystallization ask questions for recapitulation of concepts	Students will: observe the various examples shown to them and will try to analyze and categorize them as an element, mixture or a compound. observe the video and solve the related questions observe the video and solve the related questions observe carefully and solve the given numerical problems observe carefully and propose the underlying principle. <u>ANNEXURE 2b</u> perform the activity and record the observations and paste the chromatogram in their notebooks. draw the diagram and the flowchart in their notebooks <u>ANNEXURE 2b</u> perform the activity and record the observations solve the problem based questions and practice NCERT back exercise	

Teaching Aids: Apparatus for all the above activities, ICR, assignments, activity worksheets and reference books.

Methodology/Innovative Methods: Explore and discover through the various activities.

Interdisciplinary links: Social Science -Water cycle

Mathematics-Preparation of a solution , calculation of concentration of a solution.

Life skills: separation of crème from milk, separation of oil from water, identification of colloids in daily life

ANNEXURE 2A,2a

ACTIVITY-SEPARATION OF DYES IN BLACK INK USING PAPER CHROMATOGRAPHY

Class-IX

Duration: 40 Mins

Nature of the Activity: Group

Learning Outcome:

Students will be able to explore that black ink is a mixture of several components through the process of Chromatography

What we have to do?

To separate the dyes present in black ink using Chromatography

What we require?

Thin strip of filter paper, pencil, scale, fountain pen, tooth pick

What do we need to know?

We know that most of the natural substances are not chemically pure. Special techniques are used to separate the various components of a mixture. Chromatography is used for separation of components of black ink. In this process Filter paper behave as the stationary phase and water behaves as the mobile phase. The separation of components depends upon the solubility of components present in the black ink in the solvent-water.

How will you proceed?

➤ **Teacher's Activity**

Teacher will brief the students about the activity and make necessary arrangements of the apparatus in the laboratory

➤ **Student's Activity**

1. Take a thin strip of filter paper
2. Draw a line on it using a pencil approximately 3cm above the lower edge.
3. Put a small drop of ink at the centre of the line .Let it dry
4. Lower the filter paper into the beaker containing water so that the drop of ink on the paper is just above the water level.
5. Leave it undisturbed till water rises upto $\frac{2}{3}$ of the length of the filter paper.

6. Watch carefully as the water rises up on the filter paper.

7. Record your observations.

What have you observed?

Original colour of the spot	
Number of colours obtained from the spot at the end of the process	
Distance travelled by component 'a' from the reference line (in cm)	
Distance travelled by component 'b' from the reference line (in cm)	
Distance travelled by solvent from the reference line(in cm)	

What have you learnt?

Black ink is a _____ It consists of _____ components.

What would you be interested to know about?

1. Name any 3 mixtures which can be separated by the process of Paper Chromatography?

2. What are the various types of Chromatography?

3. What do you understand by Retardation factor(R_f)? Compute the Retardation Factor for the above process.

ANNXURE 2B,2b
CRYSTALLIZATION

Subject	Science
Class	IX
Chapter/Unit	Is Matter around us Pure?
Topic	How can we obtain pure copper sulphate from an impure sample?
Time	60 minutes
Nature of Activity	Individual

What will I learn (Learning Outcome)?

To separate pure crystals of copper sulphate from its impure mixture.

Skills:

Analyzing, Problem Solving, Creating

What I have to do?

To prepare pure crystals of copper sulphate from impure (crude) sample.

What do I require?

crude sample of copper sulphate, dil.H₂SO₄, Distilled water, cold water mixture, china dish, 2 beakers(250mL), glass rod, spatula, funnel, filter paper and measuring jar, test-tube stand, watch glass, trough, evaporating dish, Iron stand with clamp.

What do I need to know?

In the process of crystallization, the impure substance is dissolved in a suitable solvent to reach its saturation point at a temperature higher than the room temperature. At this high temperature, the solute has very high solubility in that solvent. When the solution is cooled, the pure substance is crystallized. The solution left behind is called mother liquor. All the impurities are left behind in the mother liquor. The purification method depends on the differences in solubility between the compound and the impurity.

➤ **Teacher's Activity**

Teacher will:

1. show the samples of dry and crystalline salts to the students. Ask them to analyze and predict the difference between them.
2. brief the activity to the students.

3. make necessary arrangements for the activity.
4. **provide jumbled up steps of the activity (it can be jumbled up in any random order and given to the students)**

Caution: *Activity requires use of dil.H₂SO₄ and heating, therefore should be strictly performed under the supervision of a teacher*

How will I proceed?

- **Student's Activity**
 - **Rearrange the steps in the correct order as given below and perform the activity.**
1. Take about 25-30 mL of distilled water in a beaker and add powdered crude copper sulphate while stirring the solution so that the powder dissolves. Keep adding the powdered sample till a little of it remains undissolved, even if it is stirred thoroughly.
 2. Now add 2-3 mL of dil. H₂SO₄ to make the solution clear. This prevents the hydrolysis of copper sulphate.
 3. Take a funnel and fix a filter paper in it and clamp it to a stand.
 4. Place a china dish under the funnel. The stem of the funnel should touch the wall of the china dish to avoid the solution splashing out.
 5. Pour the solution into the funnel over a glass rod and collect the filtrate in a china dish.
 6. Heat the china dish till the solution is reduced to about one-third of its original volume.
 7. Turn off the burner and stop heating. Transfer the hot saturated solution into a crystallizing dish.
 8. Place the crystallization dish containing the hot saturated solution in a trough containing cold water filled to the brim and allow it to cool.
 9. Record your observations.

What have I observed?

S. No.	Hot saturated copper sulphate solution	Observations (state, colour and shape of the salt)
1	Upon cooling	

What have I learnt?

Upon _____ a hot _____ solution of an _____ salt in water, we can obtain _____ of that salt.

What am I curious to learn?

- Let us take small amount of impure sample of potash alum in distilled water and try to prepare crystals of this salt by following the above steps. Is the shape and the colour crystals of alum same as that of copper sulphate? Justify your observations?

Let me evaluate myself

Q1. Predict the chemical name and formula of crystalline copper sulphate salt.

Q2. What do you understand by water of crystallization?

Q3. Why does the copper sulphate salt crystallize upon cooling?

Q4. What will you observe upon heating this crystalline salt?

Q5. State any two applications of the process of crystallization at a large scale?
