

Class:8	Subject: Science	Topic: Materials-Metals and Non Metals
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Metals and Non-metals SUMMARY SHEET		
Learner Previous Knowledge	Different natural occurring substances	
Target Knowledge for this Topic	Basic introduction to Periodic Table and explain with reference to metals only; Classification of elements: Know that elements can be classified as metals, non-metals or metalloids; Physical and chemical properties of metals and non-metals Study the physical and chemical properties of metals and non-metals; Uses Find out about the various uses of metals and non-metals;	
Learning Goals		
More Complex Learning Goal- Students will be able to form conclusions about behaviour of metals and non-metals on the basis of their chemical and physical properties and describe their position in Periodic Table.		
Target Learning Goal- Students will be able to describe the physical and chemical properties as well as uses of metals and non-metals, define Periodic table and explain it with reference to metals.		
Simpler Learning Goal- Students will be able to recognize metals and non-metals based on their properties.		
Period No.	Lesson Objectives	Teaching Learning Materials Required
1 & 2	Deduce the properties of metals and non-metals and categorise them on its basis.	• Board and markers • Reference sheet 1 • Worksheet 1 • Activities: (for each group) iron filings, copper filings, aluminium nuggets, sulphur, piece of coal, piece of chalk, copper wire, electric cell, two wires, a bulb, metallic spoon, hammer, candle
3&4	• Infer how metals and nonmetals react with oxygen chemically and thereby deduce its	• Board and markers • Reference sheet 2 • Worksheet 2

	chemical property.	
5	Demonstrate chemical reaction between metals and nonmetals with water	- Board and markers - Reference sheet 3 - Worksheet 3 - Demonstration by the teacher: piece of sodium, filter paper, beaker of water, cotton, litmus paper, - Activity: [for each group] Beaker of water, piece of iron, copper, aluminium
6&7	Deduce how metals and nonmetals react with acids	- Board and markers - Reference sheet 4 - Worksheet 4 - Experiment 1: [for each group] 5 test tubes, Magnesium ribbon, Aluminium foil, Iron filings, Copper turnings, Zinc granules, dilute Hydrochloric acid [Dil. HCl] and dilute Sulphuric Acid [Dil. H₂SO₄], Bunsen burner, tongs, dropper, matchbox - Experiment 2: [for each group] 2 test tubes, charcoal powder, sulphur powder, dilute Hydrochloric acid [Dil. HCl] and dilute Sulphuric Acid [Dil. H₂SO₄], Bunsen burner, tongs, dropper, and matchbox
8	Demonstrate reaction of metals with bases.	- Board and markers - Worksheet 5 - Experiment: [for each group] Zinc granules, Aluminium foil, Sodium Hydroxide [NaOH], matchbox, test tube
9	Explain Displacement Reactions and represent them as word equations	- Board and markers - Worksheet 6 - Experimental setup at each station for each group: 5 beakers numbered 1-5; Beaker 1 & 2-Copper Sulphate solution - Beaker 3 & 4- Zinc Sulphate solution

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		▪ Beaker 5-Iron sulphate solution ▪ Zinc granules, Copper turnings, Iron nails
10	• Present uses of metals and nonmetals.	• Board and markers • Chart paper and colour pens (for each group)

Period 1 & 2

Lesson Objectives

At the end of this lesson students will be able to:

- Deduce the properties of metals and non-metals and categorise them on its basis.

Teaching Learning Materials required

- Board and markers
- Worksheet 1
- Reference sheet 1
- Activities: (for each group) iron filings, copper filings, aluminium nuggets, sulphur, piece of coal, piece of chalk, copper wire, electric cell, two wires, a bulb, metallic spoon, hammer, candle

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5 each

Lesson Beginning <u>Time:</u> 10 min <u>Purpose:</u> • Activate prior knowledge	<u>Introduction to the topic with an activity</u> • Ask students what they understand by the term metals. Collect response. Inform them that they must identify metals from a group of substances given, based on their previous knowledge. • Distribute worksheet 1 to the groups along with the samples of substances as mentioned in the worksheet. • Let there now be a whole class discussion about the different materials given to them. • Inform students that they will now deduce properties of metals by doing some activities.
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Lesson Middle <u>Time:</u> 55 min. <u>Purpose:</u> Develop conceptual understanding	<u>Activities!!</u> - Let the groups gather together. - Ask them to follow instructions and do the activity. - While the groups are working go around, visit all the groups. - After they finish the activities each student must independently attempt questions given in the worksheet. - Let there be a whole class discussion in which the groups may exchange their answers related to the worksheet. - Discuss the properties of metals and nonmetals with the help of reference sheet 1
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	Wrap up the class by clearing any doubts that the students may have.

Worksheet 1

Skill: Observation and Investigation

Which of these is metal?

Activity 1

Material: iron filings, copper filings, aluminium nuggets, sulphur, piece of coal, piece of chalk

Instructions:

1. Observe the given substances.
2. Write your observation in the table.
3. Deduce from your observations which ones are metals and which ones are not. The substances which are not are called nonmetals.

Observation Table

Substance/Material	Appearance Shiny/Dull	Hardness (hard/brittle/soft)
iron filings		
sulphur		
piece of coal		
copper filings		
piece of chalk		
aluminium nuggets		

Metals are shiny in appearance and have lustre. They are also very hard and difficult to break. Based on these properties, deduce which of the substances which you observe are metals and which are nonmetals.

Metals	Nonmetals

Let us find out properties of metals.

Activity 1

Material: iron nail, piece of chalk, thick copper/aluminium wire, piece of coal, hammer

Instructions

1. Beat the iron nail hard with the hammer for a few minutes. Be careful and do not hurt yourself.
2. Try to hit hard. Repeat this with each item.
3. Which of these changes shape? Tabulate your observation and answer the questions.

Object	Changed shape/Broke

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Iron nail	
Chalk piece	
Coal piece	
Aluminium wire	

Questions:

a) Which of the objects is metal?

b) What happened when you hammered the metals and nonmetals?

The property because of which you can beat the objects into sheets is called malleability and the object is referred as malleable.

Which property of metals have you deduced?

I have deduced that _____

Activity 2

Material: iron nail, piece of chalk, copper wire, piece of coal, electric cell, two wires, a bulb

Instructions

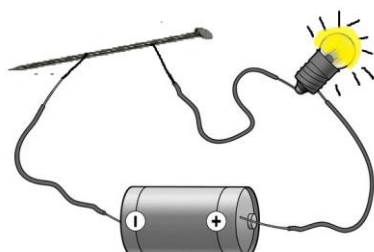
1. Join the wires with the cell, iron nail and the bulb to make a circuit as shown in the figure. Recall how you made simple electric circuits in the previous class. Does the bulb light? Record your observation.
2. Repeat this activity with all the items given to you. Tabulate your observation.

** Object which allows electricity to pass through it is called good conductor and the one which do not allow electricity to pass through them or allow very less electricity to pass through them are called poor conductors.*

Object	Good conductor/Poor conductor
Iron nail	
Chalk piece	

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Coal piece	
Copper wire	



Which property of metals have you deduced?

I have deduced that _____

Activity 3

Material: metallic spoon, copper wire, piece of coal, piece of wood, piece of chalk, candle

Instructions: Observe the given objects. Which of these will you expect to become hot if they are held in a flame of candle? If you cannot decide, you can light the candle and check for yourself. List the objects which became hot. _____

Which property of metals have you deduced?

I have deduced that _____

Now answer:

I. List the properties of metals.

II. Thin silver foil or gold foil is used to decorate desserts. Which property of metals has been used here?

III. Why does a metal pan have a wooden/plastic handle?

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IV. Copper and silver can be drawn into thin wires because metals are _____. [Name the property]

V. It is easier to make ringing sound using a metallic plate than a wooden one because _____

Reference sheet 1

Information

The outward properties of metals are called their physical properties. Given below are some general physical properties exhibited by most of the metals.

- They are lustrous (shiny)
- They are hard.

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- They are good conductors of heat and electricity.
- They are malleable and ductile meaning they can be beaten into sheets or drawn into wires.
- They produce a sonorous, ringing sound.

Nonmetals on the other hand are

- They are not good conductors of electricity or heat.
- They are very brittle in their solid form.
- They are not malleable or ductile.
- They do not produce a ringing sound.
- They do not have lustre.

Period 3 & 4

Lesson Objectives

At the end of this lesson students will be able to:

- Infer how metals and nonmetals react with oxygen chemically and thereby deduce its chemical property.

Teaching Learning Materials required

- Board and markers

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- Worksheet 2
- Reference sheet 2
- Material for experiment- Magnesium ribbon, distilled water, red and blue litmus paper, spirit lamp, tongs, watch glass, sand paper, match box, powdered sulphur, water, glass jar, lid, deflagrating spoon.

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5 each

Note for the facilitator- Keep the setup ready for the demonstration of nature of metal and non-metal oxides as per the instructions given in reference sheet 2.

Lesson Beginning <u>Time:</u> 10 min <u>Purpose:</u> • Activate prior knowledge	<u>Introduction to the topic through brainstorming</u> • Ask students following questions ○ What is a chemical reaction? ○ What kind of change can you expect in chemical reaction? ○ You must have seen iron objects such as nails and wires getting rusted. What exactly happens when object gets rusted? ○ Why do you think silver objects become tarnished if exposed to air for a long time? ○ A copper object will turn green in colour if the atmosphere around is humid. In all these three cases, what is the common factor? ○ Rusting of iron is chemical change. Do you think it is possible to reverse it? • Collect responses and then inform the students that they will now study some chemical properties of metals and nonmetals by doing some activities.
Lesson Middle <u>Time:</u> 55 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Experiments</u> • Distribute worksheet 2. • Ask the groups to observe the experiments carefully. (Instructions are given in reference sheet 2) • After the experiments, the groups must attempt the worksheet. • There can be a whole class discussion now in which the observation of experiments and answers of the worksheet can be discussed.

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	• Ensure that the class is in consensus. • Discuss more about metallic oxides and non-metallic oxides with the help of Information given in reference sheet 2.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	• Clear any doubts that the students may have.

Worksheet 2

Skill: Observation and Investigation

1. In Experiment 1, a chemical reaction takes place between magnesium and oxygen. What are their symbols? _____

2. The reaction which takes place is as follows:



- Name the symbols and formula of this equation. _____
- Name the compound formed in this equation. _____

3. When nonmetal is heated in oxygen it forms that nonmetallic dioxide [oxide with 2 oxygen atoms]. As seen in the experiment, sulphur forms sulphur dioxide.
Can you guess what Carbon will form with oxygen? _____
What will be the nature of this substance formed? _____

4. Based on your knowledge gained from experiments, can you guess what product is formed in the following reactions of metals with oxygen?

I. aluminium + oxygen $\longrightarrow$

II. zinc + oxygen $\longrightarrow$

III. copper + oxygen $\longrightarrow$

5. Based on your knowledge gained from experiments, guess what product is formed in the following reactions of nonmetals with oxygen

I. Carbon burns in air to form _____. Carbon + oxygen $\rightarrow$

II. Sulphur burns in air to form _____. Sulphur + oxygen $\rightarrow$

Reference sheet 2

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Instructions for demonstration 1.

Aim Of The Activity

- Find the nature of mettalic oxides.

Materials Required

- Magnesium ribbon, distilled water, red and blue litmus papers, sand paper, spirit lamp, watch glass, a pair of tongs, match box.

Steps To Follow

- Take a small piece of magnesium ribbon. Clean it properly with a sand paper.
- Hold magnesium ribbon with the help of a pair of tongs.
- Bring the free end of magnesium ribbon near the flame of the spirit lamp and let it burn (Do not stare at the burning magnesium).
- Collect the powdery ash in a watch glass.
- Add small amount of distilled water to the ash and stir it.
- Dip one by one blue and red litmus papers in the solution and observe the change in colour of litmus papers.

Instructions for demonstration 2.

Aim Of The Activity

- Find the nature of non-metallic oxides.

Materials Required

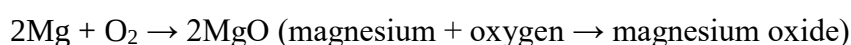
- Powdered sulphur, water, glass tumbler/ gas jar, lid, watch glass, red and blue litmus papers, deflagrating spoon, spirit lamp, match box.

Steps To Follow

- Take some sulphur powder in a deflagrating spoon and heat it over a spirit lamp.
- Introduce the spoon with burning sulphur into a glass tumbler/jar containing some water (Fig. a). Take care that spoon should not dip in the water.
- Cover the tumbler/jar with a lid to stop the escape of gas produced during burning of sulphur.
- Remove the spoon after some time.
- Shake the covered tumbler well to dissolve the gas in water.
- Transfer the solution in watch glass (Fig.b).
- Dip one by one red and blue litmus papers in the solution (Fig.c) and observe the change in the colour of the litmus papers.

Information

- Metals react with oxygen in the air to form the metal oxide. The product of burning a metal in oxygen is a metal oxide.



- Non-metals react with oxygen in the air to produce non-metal oxides.
- For instance, carbon burns in air to form carbon dioxide and sulphur burns in air to form sulphur dioxide:

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carbon + oxygen → carbon dioxide

sulphur + oxygen → sulphur dioxide

- Non-metal oxides such as sulphur dioxide and nitrogen oxide cause **acid rain**. They dissolve in the water in the clouds to form acidic solutions and when it rains there is a good amount of acid in it. This acid rain damages rocks and buildings, and harms living things too.

Differences between metal oxides and non-metal oxides

Metal oxides	Non-metal oxides
solids at room temperature	usually gases at room temperature
they are basic in nature and turn red litmus blue	dissolve in water to form acidic solutions turning blue litmus red

Period 5

Lesson Objectives

At the end of this lesson students will be able to:

- Infer about chemical reaction between metals and nonmetals with water

Teaching Learning Materials required

- Board and markers
- Worksheet 3

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- Reference sheet 3
- Demonstration by the teacher: piece of sodium, filter paper, beaker of water, cotton, litmus paper,
- Activity: [for each group] Beaker of water, piece of iron, copper, aluminium

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4-5 each

Note for facilitator- Keep the setup ready for the demonstration of reaction of sodium with water as per the instructions given in reference sheet 3.

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge	<u>Whole class Discussion</u> • Ask the students how metals and nonmetals reacted with oxygen in the previous class. • Have a whole class discussion in which the following questions can be posed: ○ What chemical property was demonstrated by metals/nonmetals when they were made to react with oxygen? ○ How will you recognize metal if you are given a sample of its oxide? ○ How will you recognize nonmetal if you are given a sample of its oxide? ○ Nonmetallic oxides are used to make acids for school laboratories. What can be the reason for this? • Collect responses from students and arrive at a consensus. Inform the students that they will now find out what happens when metals and nonmetals react with water.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Demonstration and Experiment</u> • Ask the students to move away from the table and observe the demonstration from a distance. • Show the demonstration. [Refer to reference sheet 3] • Distribute worksheet 3 to the students. • Ask each group to discuss what they saw and then every student must fill in the observation questions independently. • There can be a whole class discussion now in which the answers can be discussed. • Ensure that the class is in consensus.

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Lesson End <u>Time:</u> 5 min <u>Purpose:</u> Finish Up	Clear any doubts that the students may have.
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Worksheet 3
Skill: Observation and Inference

I. Observation questions based on the demonstration observed

- What happened when sodium was dropped in water? What does this indicate to you?

- How did the beaker feel when you touched it?

- Why do you think the beaker felt very hot? What must have happened?

- What colour change did you observe from the litmus test? What do you deduce from it?

II. Find out if these metals react with water:

Dip a piece of iron, copper, aluminium, gold/silver if possible [Think if someone dips his/her gold ring or bangle in water beaker] and observe.

Was there any change? Was the reaction same as sodium with water?

* The reason you did not observe any reaction was because metals react with water in a certain manner. Potassium, sodium and calcium react with cold water. Magnesium and aluminum react with steam and that too very slowly. Copper, silver and gold do not react at all with water.

** Nonmetals do not react with water though there are some nonmetals which react with air.

Example: Phosphorus. Phosphorus catches fire if exposed to air.

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Based on your observations, which property of metals and nonmetals have you inferred?

I have inferred that _____

Reference sheet 3

Demonstration of Sodium reacting with water

Ask students to observe from a distance and do this demonstration carefully.

Material: piece of sodium, filter paper, beaker of water, cotton, litmus paper

Instructions

1. Take a beaker half-filled with water.
2. Carefully cut a small piece of sodium with a knife. (piece should be of only wheat seed size)
3. Pat it dry with a filter paper.
4. Wrap it in cotton and put it in water.
5. Observe what happens.
6. After the reaction stops, touch the beaker.
7. Test the water with litmus paper.

Period 6 & 7

Lesson Objectives

At the end of this lesson students will be able to:

- Deduce how metals and nonmetals react with acids

Teaching Learning Materials required

- Board and markers

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- Reference sheet 4
- Worksheet 4
- Experiment 1: [for each group] 5 test tubes, Magnesium ribbon, Aluminium foil, Iron filings, Copper turnings, Zinc granules, dilute Hydrochloric acid [Dil. HCl] and dilute Sulphuric Acid [Dil. H₂SO₄], Bunsen burner, tongs, dropper, matchbox
- Experiment 2: [for each group] 2 test tubes, charcoal powder, sulphur powder, dilute Hydrochloric acid [Dil. HCl] and dilute Sulphuric Acid [Dil. H₂SO₄], Bunsen burner, tongs, dropper, and matchbox

Details of Teaching Learning Experience

Seating Arrangement: In small groups of 4-5 students

Note for facilitator- Keep the materials ready for the experiment. Make sure students conduct the experiment in proper supervision and safety. You can ask your colleagues to help you during the experiments.

Lesson Beginning <u>Time:</u> 10 min <u>Purpose:</u> • Activate prior knowledge	<u>Whole Class Discussion</u> • Ask a few students to recap the chemical properties which they have studied until now. • Ask students the nature of metals and nonmetals. Given that, ask them which substances are used to form acids and bases. The expected answer is that metals are present in bases and nonmetals are present in acids. • Now draw the tables on the board as given in reference sheet 4 (Part A). • Ask students to name the metals/nonmetals present in acids and bases and fill the table by seeking response from the students. • Ensure that the students are in consensus. • Inform the students that they will now find out how metals and nonmetals react with acids by doing experiment.
Lesson Middle <u>Time:</u> 55 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Experiments</u> • Distribute worksheet 4 to all students. • Each group must do the experiments mentioned in worksheet 4 and fill in the observation table. • They can then gather in groups and exchange their response. • There can now be a whole class discussion in which the answers will be discussed.

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	• All the students must be in consensus. • Refer to reference sheet 4 (Part B) for further discussion.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	• Wrap up the class by clearing doubts if needed.

Reference sheet 4

Part A

I. Guess the metal in the given base.

Base	Metal present in the base
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Calcium Hydroxide	
Magnesium Hydroxide	
Sodium Hydroxide	
Potassium Hydroxide	

II. Guess the nonmetal in the given acid.

Acid	Nonmetal present in the acid
Hydrochloric Acid	
Sulphuric Acid	
Nitric Acid	
Carbonic Acid	

Part B

Information

Reactions of acids with metals/nonmetals

- Acids react with most metals and a salt is produced along with **hydrogen gas**.

metal + acid $\rightarrow$ salt + hydrogen

- The salt produced depends upon the metal and the acid. For example:

zinc + sulphuric acid $\rightarrow$ zinc sulphate + hydrogen

magnesium + hydrochloric acid $\rightarrow$ magnesium chloride + hydrogen

- Potassium, sodium, lithium and calcium all react violently with dilute sulphuric acid and dilute hydrochloric acid. It is dangerous to put these metals into an acid.

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- Of the metals Magnesium, aluminium, zinc, iron, tin and lead, all of them react safely with dilute acid. Magnesium is the fastest and lead is the slowest of the six.
- Nonmetals generally do not react with acids.

Worksheet 4

Skill: Observation and Investigation

What happens when metals/nonmetals react with acids?

Experiment 1

Aim: To observe reaction between metals and acids

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Material: 5 test tubes, Magnesium ribbon, Aluminium foil, Iron filings, Copper turnings, Zinc granules, dilute Hydrochloric acid [Dil. HCl] and dilute Sulphuric Acid [Dil. H₂SO₄], Bunsen burner, tongs, and dropper

Instructions:

1. Number the test tubes 1-5. In test tube 1, add Magnesium ribbon. Hold the test tube with a tong.
2. Now with a dropper slowly add Dil HCl. Observe what happens.
3. Now, quickly close the mouth of test tube either with your thumb or with a stopper. Keep the mouth of the test tube away from yourself. Ask one of your friends to light a matchstick (be careful!!) and bring it close to the mouth of the test tube.
4. Now heat the mixture very gently and observe. Note the observation in the given observation table.
5. Repeat the same with Dil. H₂SO₄ now.
6. Repeat the activity from steps 1-9 for Aluminium foil, iron filings, zinc granules and copper turnings and note your observation.

Reaction of Metals with Acids

Metal	Reaction with Dil.HCl		Reaction with Dil H ₂ SO ₄	
	Room Temp.	Warm	Room Temp.	Warm
Mg ribbon				
Al foil				
Fe filings				
Zn granules				
Cu turnings				

Experiment 2

Aim: To observe reaction between nonmetals and acids

Material: 2 test tubes, charcoal powder, sulphur powder, dilute Hydrochloric acid [Dil. HCl] and dilute Sulphuric Acid [Dil. H₂SO₄], Bunsen burner, tongs and dropper.

Instructions:

1. Number the test tubes 1 & 2. In test tube 1, add charcoal powder. Hold the test tube with a tong.
2. Now with a dropper slowly add Dil HCl. Observe what happens.

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- Now, close the mouth of test tube either with your thumb or with a stopper. Keep the mouth of the test tube away from yourself. Ask one of your friends to light a matchstick (be careful!!) and bring it close to the mouth of the test tube.
- Now heat the mixture very gently and observe. Note the observation in the given observation table.
- Repeat the same with Dil. H_2SO_4 now.
- Repeat the activity from steps 1-9 for Sulphur powder and note your observation.

Reaction of Nonmetals with Acids

Metal	Reaction with Dil. HCl		Reaction with Dil. H_2SO_4	
	Room Temp.	Warm	Room Temp.	Warm
Charcoal powder				
Sulphur powder				

What conclusion have you drawn from these experiments? Do metals/nonmetals react with acids?

- I have concluded that metals _____ with acids to give out _____
- I have concluded that nonmetals _____ with acids and _____ give out _____.

Period 8

Lesson Objectives

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At the end of this lesson students will be able to:

- Demonstrate reaction of metals with bases.

Teaching Learning Materials required

- Board and markers
- Worksheet 5
- Experiment: [for each group] Zinc granules, Aluminium foil, Sodium Hydroxide [NaOH], matchbox, test tube

Details of Teaching Learning Experience

Seating Arrangement: In small groups of 4-5

Note for the facilitator – Keep the setup ready for demonstrating the experiment of reaction of bases with metals as per the instructions given in the worksheet 5.

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Introduce the topic	• Ask the students to share their observation from the last class. • Ask the students 'What do you think will be the reaction between metals and bases?' • Distribute worksheet 5 to the students.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Experiment</u> • Ask the students to observe experiment carefully. • The students must attempt questions based on it. • Let them attempt questions based on it. They can do so after discussing with their group members. • Let there be an open class discussion in which all the answers can be discussed.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	• Clear any doubts that the students may have.

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Worksheet 5 **Skill: \Spirit of Inquiry**

Experiment (to be demonstrated)

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Material: Zinc granules, Aluminium foil, Sodium Hydroxide [NaOH], matchbox, test tube

Instruction:

1. In test tube, add Zinc granules. Hold the test tube with a tong.
2. Now with a dropper slowly add Sodium Hydroxide [NaOH]. Observe what happens.
3. Close the mouth of test tube either with your thumb or with a stopper. Keep the mouth of the test tube away from yourself. Light a matchstick (be careful!!) and bring it close to the mouth of the test tube.
4. Repeat the activity with Aluminium foil.

Observation Questions:

1. What happened when you lighted matchstick at the mouth of test tube? _____
2. Which gas is evolved? _____
3. How did you know it was hydrogen gas? _____

Information: Reactions of bases with nonmetals are very complex.

Which property of metals have you have observed through this experiment?

I have observed that some metals react with bases _____

Period 9

Lesson Objectives

At the end of this lesson students will be able to:

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- Explain Displacement Reactions and represent them as word equations

Teaching Learning Materials required

- Annexure 9A: (one per student)
- Annexure 9B: (one per student)
- Experimental setup:
 - 5 beakers numbered 1-5; Beaker 1 & 2-Copper Sulphate solution
 - Beaker 3 & 4- Zinc Sulphate solution
 - Beaker 5-Iron sulphate solution
 - Zinc granules, Copper turnings, Iron nails

Details of Teaching Learning Experience

Seating Arrangement: In small groups of 4-5

Note to the facilitator: Please arrange experimental setups beforehand to save on time.

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge	<u>Recap of the topic</u> • Begin the class by asking students to recall all the chemical properties of metals and nonmetals that they have studied until now. • Randomly ask the students to name a few metals which they found to be reactive and few which were very less reactive. • Now ask the students to recall the process of galvanization which they did in previous class. • Collect a few responses and arrive at the answer that copper was displaced by iron in the reaction. • Inform students that just as in musical chair one of the players gets displaced because another player sits on the chair, in some reactions the metals too play 'musical chairs' and the process is called Displacement Reactions. • Inform the students that they will now do experiment and find out which metals are displaced by which other metals.
Lesson Middle <u>Time:</u> 25 min.	<u>Experiment</u> • Distribute worksheet 6 to all students. • Ask each group to quickly assemble at the table.

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<u>Purpose:</u> Develop conceptual understanding	- Let the groups now follow instructions and do the experiment. - Let them record the observations. - Let the students attempt the part 1 of the worksheet individually. - This can be followed by a whole class discussion in which the answers are discussed. The whole class must be on the same page.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> - Finish Up - Homework Distribution	- Clear any doubts that the students may have. <u>Homework Assignment</u> - Ask students to do part 2 of worksheet 6 at home. - Ask students to observe how metals and nonmetals are used at their home and make a list of their uses in their notebook.

Worksheet 6

Skill: Observation and Investigation

Part 1

Information

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Metal Displacement Reactions

- Some metals are more **reactive** than others. A more reactive metal displaces (pushes out) a less reactive metal from its compound.
- A metal will displace (take the place of) a less reactive metal in a metal salt solution.
- Such reaction in which a metal is displaced from its metal salt by another metal is called Displacement Reaction of metals.

Experiment

Material:

- 5 beakers numbered 1-5; Beaker 1 & 2-Copper Sulphate solution
- Beaker 3 & 4- Zinc Sulphate solution
- Beaker 5-Iron sulphate solution
- Zinc granules, Copper turnings, Iron nails

Instruction

1. Add Zinc granules in beaker 1, Iron nails to beaker 2, Copper turnings to Beaker 3, Iron nails to beaker 4 and copper turnings to beaker 5.
2. Record how the solutions look in colour and record your observation. Keep the beakers undisturbed for some time.
3. Now observe the solution once again. Do you see any change?

Observation Questions:

1. What was the colour of solution in beaker 1 initially and what happened later?

2. What did you see at the bottom of beaker 1?

3. What was the colour of solution in beaker 2 initially and what happened later?

4. What did you see at the bottom of beaker 2?

5. What did you observe in beaker 3, 4 and 5? Was there a colour change?

Based on your observation answer the following questions:

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1. In Beaker 1, the red mass that you see is that of copper. What do you understand from this? [Hint *: Which metal has been displaced? And by what?]

2. Why do you think the blue copper sulphate solution lost its colour?

3. In Beaker 2, the red mass that you see is that of copper. What do you understand from this?

4. Why do you think the blue copper sulphate solution lost its colour?

5. So out of Zinc and copper [as in beaker 1] which metal is more reactive?_____

6. Out of Iron and copper [as in beaker 2] which metal is more reactive?_____

7. Can you now infer why there was no reaction in beaker 3 when copper turnings were put in zinc sulphate?_____

8. Even Zinc sulphate and iron nails do not react. What does it mean? Which of the two is more reactive in that case?_____

Part- 2

I. Can you now guess the sequence of metals from more reactive to less reactive among Zinc, iron and copper?

II. In Beaker 1, following reaction takes place:

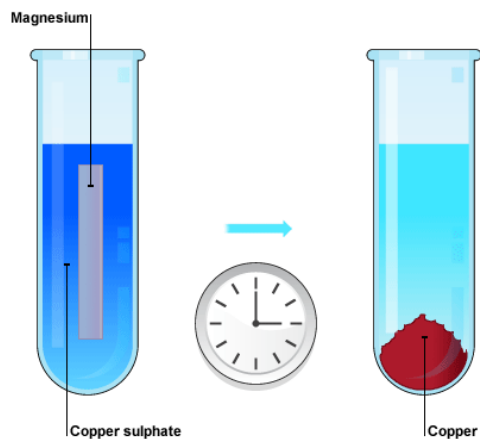
Copper sulphate + Zinc $\longrightarrow$ Zinc sulphate +Copper

Now predict and write reaction which took place in Beaker 2.

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III. If a less reactive metal is added to a metal salt solution then_____

IV. Observe the diagram of an experiment and write what you have understood.



Which property of metals have you deduced from this experiment?

I have deduced that _____

Period 10

Lesson Objectives

At the end of this lesson students will be able to:

- Present uses of metals and nonmetals.

Teaching Learning Materials required

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- Board and markers
- Chart paper and colour pens

Details of Teaching Learning Experience

Seating Arrangement: In small groups of 4 or 5

Lesson Beginning <u>Time:</u> 5 min <u>Purpose:</u> • Activate prior knowledge	<u>Recap</u> • Begin the class by asking students to recap all the properties of metals and nonmetals. • Discuss the home assignment given in the last class. • Now inform students that they have to present uses of metals and non-metals creatively in a chart paper. • Ask each group to elect a captain. • Distribute the chart papers and colour pens.
Lesson Middle <u>Time:</u> 25 min. <u>Purpose:</u> • Develop conceptual understanding	<u>Chart presentation</u> • Ask the captain to divide his/her group into 2 subgroups. • One sub group should focus on uses of metals and the other on uses of nonmetals. • Each subgroup must first collate all the uses that they must have gathered as per the homework given. • The captain can then decide how to present the matter after doing a brief discussion. • Each group must work on the presentation. • Go around, visit the groups and then select 2 best presentations which can be put up on the soft board.
Lesson End <u>Time:</u> 5 min <u>Purpose:</u> • Finish Up	<u>Brainstorming</u> • Wrap up the class by having a brainstorming session. Pose questions such as: ○ Name 2 industries in which metals are used. ○ Which nonmetals are essential for living? ○ Quickly look around and name 2 metals and 2 nonmetals. ○ Why is gold very useful for making jewellery? ○ How can metals and nonmetals be used together to make kitchenware?