1.document name

Science _8th_Materials –Metals & Nonmetals _Mona gupta& Vijay rani_Govt. Adarsh Senior Secondary School LodhipurAnandpur Sahib/Govt model school Ramnagar ,dist-Bhatinda

2.Section A. Basic description of the chapter

Name of the school	Govt. Adarsh senior secondary school lodhipur ,Anandpur Sahib/govt model school Ramnagar dist. Bhatinda
Name of the teacher	Mona gupta/vijay rani
Class	8th
Subject	Science
Name of the chapter	Materials-metals & nonmetals
No of periods required to teach the chapter	9

EDITED BY:-JATINDER KUMAR SHARMA SCIENCE MASTER

INDERPURI GOVT GIRLS SENIOR SECONDARY SCHOOL,HERIAN (S.B.S.NAGAR)

Section B-objectives /expected learning outcomes-

B1 concepts:

1. Metals
2. Nonmetals
3. Physical properties of metals
4. Malleability
5. Ductility
6. Conductor
7. Sonorous

8. Chemical properties of Metals and Non-Metals

- Reaction with oxygen
- Reaction with water
- Reaction with acid & base
- Displacement reactions

9. Uses of Metals and Non-Metals

B 2- Usefulness in daily life

- Students will learn

- Use of metals for making Alloys, Utensils, Ornaments, different electricgadgets ,heating element,electric wires.

- Without learning this concept they will not understand
  - which materials the wires are made up of ?
  - composition of fertilizers, medicines, fire crackers, etc.
  - about purification of water.
- -this knowledge is helpful in Steel industry, medicine, chemist, cracker industry, &agriculturist.

Ill effects of metals and non-metals on living systems

B3 Life skills

- Team skills
- Usefulness of Metals and Non-Metals
- Creativity
- Analytical and Research skill.
- Presentation skill

B4 Vocabulary

Metal, Non-Metal, Hard, lustrous, Malleable, Ductile, Sonorous, Conductors, Insulators,Sulphuric Acid, Calcium Hydroxide, Gadgets, Crackers.

S. N.	WORD IN ENGLISH	MEANING IN PUNJABI	PRONUNCIATION IN ENGLISH	TRANSLITERATION IN PUNJABI
1.	Metal			
2.	Nonmetal			

3.	Lustrous			
4.	Malleable			
5.	Conductor			
6.	Insulator			
7.	Gadgets			
8.	Crackers			
9.	Rust			
10.	corrosion			
11.	ductility			

ection C P.K. testing

- What do you mean by matter?
- What are its types?
- Can you give me some examples where the matter is solid & have shining?
- Do you know which material utensils are made up of ?
- Which material the school bell is made up of?
- What is used in a thermometer to measure the temperature?
- Which term is used for these materials?

Section D-

1. Period wise break up of the chapter-

Period	What to be covered
1	Introduction of the chapter through some activity , previous knowledge testing,,talking to the students regarding daily life phenomenon & events where the concepts of this lesson are used,appearance & hardness as a tool to identify the nature of materialintroduction of physical properties of metals
2	Learning about malleability & electrical conductivity.
3	Ductility & sonorous nature of metal discussion about the physical properties of metals .recap of the previous knowledge
4	Introduction to the chemical properties of metals &non metals.reaction of metals with air.
5	Reaction of metals with water

6	Reaction of metals with acids & bases with the help of an activity & to prepare a presentation
7	Presentation of the activity & its assessment
8	Explanation of displacement reactions with the help of a demonstration
9	Explanation of uses of metals & nonmetals & reactivity series.
10	Revision of lesson and discussion of back exercise.

Section -E

Micro planning of the periods -1 period

Introduction of the concept of identification of materials as metals & nonmetals	10 min	✓ P. K testing will be done by asking questions as given in section C .Perform activity to identify the nature of material on the basis of their hardness & appearance. For details refer to annexure GA1 ✓ Teacher will ask students to categorise the substances on the basis of their hardness & appearance? ✓ Materials which are hard & have shining are called metals. ✓ Materials which are soft & dull are called nonmetals.however there are some exceptions in each case.like sodium is a soft metal & carbon (diamond) is a hard nonmetal
Talking to the students about the physical properties of matter	15 min	✓ Teacher will ask students what do you understand by the physical properties of matter. ✓ These are the properties which are used to identify the matter likecolor ,odor,state,melting point boiling point etc.as a person can be identified by its face, fingerprints, height,voice ,DNA etc .so these are the physical properties of the person.
Talking to the	10min	✓ How can we prevent iron objects from

students regarding daily life phenomenon& events explained by the concept of the chapter		Rusting? ✓ why metals are used in making electric wires ,geysers,heating element etc.? ✓ why silver articles get blackened after some time ? ✓ how displacement reactions are used in metallurgy? ✓ Which salts of different metals are used in making medicines ,fertilizers,water purifier? ✓ Which metal is used for decoration of sweets?
Home assignment	5	Identify the things which are made up of metals in your surroundings. Name five metals & five nonmetals which we use in our daily life.

Hint –iron articles can be prevented from rusting by painting ,oiling & greasing.

Silver articles get blackened by the reaction of silver with air.

Copper metal is used for making electric wires.

Silver is the best conductor of electricity.

Lead & iron are poor conductor of electricity.

Silver foil is used for decoration of sweets

Potassium per manganate is used as a disinfectant.

Sodium, potassium, nitrogen& phosphorous salts are used in the manufacturing of fertilizers.

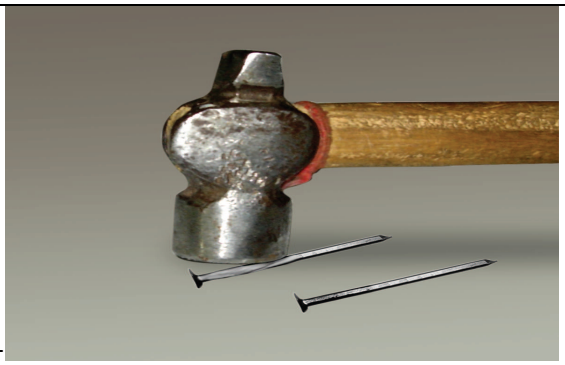
Most metals exist as solids in nature however mercury is the only metal which is liquid at room temperature & is used in thermometers.

Annexure name	GA1
Name of the activity	Identification of material on the basis of hardness & appearance
Objective	To introduce the concept of metal & nonmetal. To increase the participation of students
Type of the activity(individual activity/ group activity / home activity etc.)	Individual activity
Material required for the activity	Iron, coal ,sulphur,aluminium,copper
Any specific preparations required in the class room for preforming the activity	n.a
Details of the activity and detailed instructions to carry it out	Teacher will ask students to categorise the substances on the basis of their hardness & appearance?
Pictures describing the activity, if any	N A
Any precautions to be kept in mind	
Explanation of the outcomes of the activity	Metals are hard & shiny while nonmetals are soft & dull.

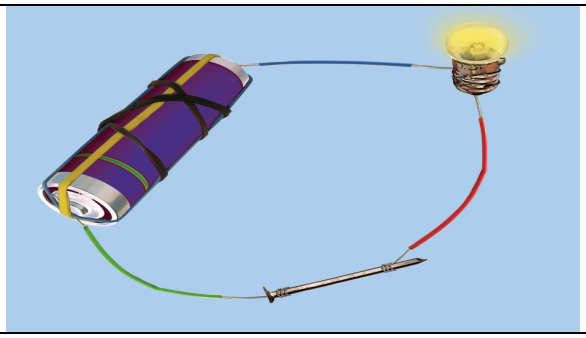
Subsection E.2 Minute to minute break up of period 2

Introduction to the concept of malleability & electrical conductivity	20mins	✓ Now the teacher will introduce the concept of malleability by dividing students in groups .details of the activity is given in annexure GA2. ✓ Students will observe that the shape of iron nail &aluminium wire will change, hence they are said to be malleable however pencil lead & coal piece will break they will not show any change in their shape so they are not malleable . ✓ Teacher will tell that ✓ The property of metals bywhich they can be beaten into thin sheetsis called malleability. This is a characteristic property of metals ✓ .metals are good conductors while nonmetals are poor conductors
Discussion of observations	15mins	On the basis of above observations teacher will ask the following questions- Why the handles of metallic pan are made up of plastic or wood? Which material the handle of screw driver is made up of & why?
Home task	5 min	Activity to be performed at home :check the electrical conductivity of different materials by using simple electric circuit. For details please refer annexure GA3

Annexure name	GA2

Name of the activity	What is malleability
Objective	To introduce the concept of malleability To increase the participation of students
Type of the activity(individual activity/ group activity / home activity etc.)	group activity
Material required for the activity	Ironnail,coal piece ,aluminium wire, pencil lead,hammer
Any specific preparations required in the class room for preforming the activity	n.a
Details of the activity and detailed instructions to carry it out	Beat the given articles with hammer & see the change if any.
Pictures describing the activity, if any	 -
Any precautions to be kept in mind	-
Explanation of the outcomes of the activity	Metals are malleable while nonmetals are not malleable.

Annexure name	GA3

Name of the activity	Identification of material which can conduct heat & electricity.
Objective	To identify which materials are conductors of heat & electricity To increase the participation of students
Type of the activity(individual activity/ group activity / home activity etc.)	Individual activity
Material required for the activity	Iron nail , coalpiece,sulphur,copper wire ,cell ,electric bulb,wire
Any specific preparations required in the class room for preforming the activity	n.a
Details of the activity and detailed instructions to carry it out	Students will check the conductivity of given materials by using electric tester.(an electric circuit made by using cell, bulb & electric wire)
Pictures describing the activity, if any	
Any precautions to be kept in mind	-
Explanation of the outcomes of the activity	Metals conduct electricity,while nonmetal can not.

Minute to minute break up of period 3

Introduction of the concept of ductility& sonorous nature	20mins	✓ Teacher will introduce the concept by asking the following questions – ✓ Have you seen the wires of copper &aluminium? ✓ Have you seen the wires of coal? ✓ Have you seen wooden bells in temples & why? ✓ Talk about the above questions & its explanation. ✓ The property of metal by which it can be drawn into wires is called ductility. ✓ The things made of metals produce a ringing sound when struck hard. Since metals produce ringing sounds, they are said to be sonorous.
Discussion **Recap**	15 min 5 min	After performing the above activities, we can say that some materials are hard, lustrous, malleable, ductile, sonorousand good conductors of heat and electricity. The materials which generally possess these properties are called metals. The examples of meta is are iron, copper, aluminum, calcium, magnesium, etc .on the contrary which do not have above properties are called nonmetals e.g. - carbon sulphur, oxygen. Differentiate between metals & nonmetals on the basis of their physical properties

- ✓ Hint –windchimes are made up of metals as they are sonorous in nature.
- ✓ Gold & silver wires are used in expensive banarasisarees to make beautiful designs

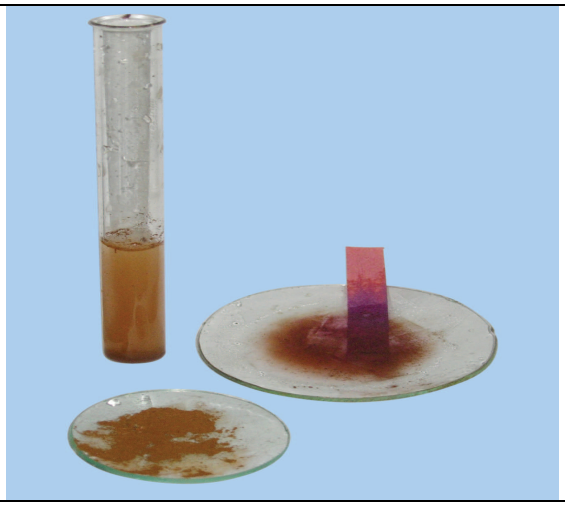
Minute to minute break up of period -4

Introduction of the concept of chemical properties of metals & nonmetals	10 mins	Teacher will ask what happens when iron comes in contact of moisture & air-(a brown color deposit is formed) What is that brown color deposit called? (rust) How rust is formed? (by the reaction of iron with air) What is rust?(iron oxide) What happens when magnesium reacts with air? (it forms magnesium oxide) Thus when metals come in contact of air they form their oxides
Group activity to test the nature of rust	10 mins	Teacher will form group of 5 or 6 students to explain the activity given in annexure-GA4

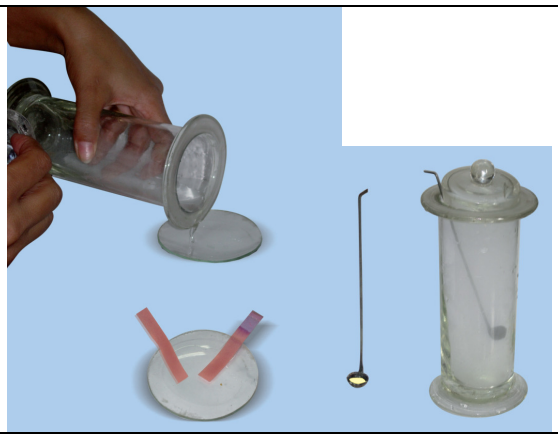
Demo activity by the teacher to check the nature of sulphur oxides	15 min	Detail of the activity is given in annexure –GA5 whensulphur is burnt it forms sulphur di oxide gas, which reacts with water to form suphurous acid. Metal oxides are basic in nature. Nonmetal oxides are acidic in nature.
Home work	5 min	Name the metal which is found in different bases like- sodium hydroxide,calcium hydroxide,pottasium hydroxide, & nonmetal which is found in hydrochloric acid ,sulphuric acid ,nitric acid,acetic acid .

Hint –the process of rusting is also known as corrosion.

Annexure name	GA4
Name of the activity	Testing the nature of rust
Objective	To introduce the concept of nature of metal oxides
Type of the activity(individual activity/ group activity / home activity etc.)	Group activity
Material required for the activity	Rust,testtube,petri dish
Any specific preparations required in the class room for preforming the activity	n.a
Details of the activity and detailed instructions to carry it out	Collect a spoonful of rust and dissolve it in a very little amount of water. rustremains suspended in water. Shakethe suspension well. Test the solution with red and blue litmuspapers. What do youobserve? Is the solution acidic orbasic?

Pictures describing the activity, if any	
Any precautions to be kept in mind	-
Explanation of the outcomes of the activity	Rust solution (metal oxides) are basic in nature

Annexure name	GA5
Name of the activity	Testing the nature of sulphur oxide. (nonmetal oxide)
Objective	To introduce the concept of nature of nonmetal oxides
Type of the activity(individual activity/ group activity / home activity etc.)	demo activity
Material required for the activity	Deflagratingspoon,sulphur,filterpaper,petridish,gas jar
Any specific preparations required in the class room for preforming the activity	n.a
Details of the activity and detailed instructions to carry it out	Take a small amount of powdered sulphur in a deflagrating spoon and heat it. As soon as sulphur starts burning, introduce the spoon into a gas jar/ glass tumbler . Cover the tumbler with a lid to ensure that the gas produced does not escape. Remove the spoon after some time. Add a small quantity of water into the tumbler and quickly replace the lid. Shake the tumbler well. Check the solution with red and blue litmus papers.

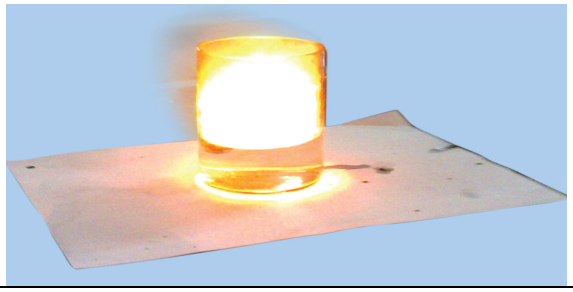
Pictures describing the activity, if any	
Any precautions to be kept in mind	-
Explanation of the outcomes of the activity	Sulphur oxide solution (nonmetal oxides) are acidic in nature

Minute to minute break up of Period -5

Introduction to the concept of reaction of metals with water	10mins	Teacher will ask the students that why we do not keep the sodium in water &phosphorus in air? Teacher will explain that we will not keep sodium in water because it reacts vigorously with water where as phosphors which is non metal kept in water, as it is highly reactive with air.
Reaction with water by demostation of activity	15 mins	Teacher will perform the act. G A 6 to demonstrate the reaction of metals with water .After act. Teacher will ask to touch the beaker&ask question- is the beaker hot ? The beaker becomes hot because lot of heat is generated in the reaction ,so we store the sodium in kerosene.
Testing with red &blue litmus paper	10 min	Now the teacher will test the solution with red &blue litmus paper and ask –Is the solution acidic or basic? The sol. Is basic because it turns the red litmus paper blue .
Reaction of non metal with water	5 mins	Teacher will explain that non metals do not react with water but they may be very reactive in air . For example phosphors is a very reactive non metal .It catches fire if exposed to air ,so it is stored in water

Hint –metals react with water to form hydroxides.hydrogen gas is released in the reaction.

Nonmetals do not react with water.however chlorine is a nonmetalwhich gets dissolved in water to form acidic solution.when the solution is placed in sunlight or is heated, oxygen gas is liberated.

ANNEXURE NAME	GA-6
Name of the activity	Reaction of sodium with water
Objectives	To explain the concept of reaction with water
Type of activity	Demonstration by teacher
Material required for the activity	250 ml beaker,water,knife,sodium,filterpaper,cotton
Any specific preparation	N.A
Details of the activity and detailed instructions to carry it out	Take a 250 ml beaker Fill half of it with water .Cut a small piece of sodium metal. Dry it using filter paper and wrap it in a small piece of cotton. Putit into a beaker. Sodium reacts vigorously with water.
Test the solution with litmus paper	The sol.is basic in nature.
Pictures if any	s 
Any precautions	Size of the metal is the of wheat grain.

Minute to minute break up of Period-6.

Reaction of metals and non metals with acid	25 mins	Teacher will divide the class in groups of 4-5 students &explain the activity given in GA-7. By using different metals /non metals, hydrochloric acid,sulphuric acid .students will tabulate the record in table & write if acids react with metals /non metals at room temp,or at high temperature.
Reaction of metals and non metals with bases	15mins	.Teacher will explain the students that metals react with acids & sodium hydroxide to produce hydrogen gas & their salts.

Annexure name	GA7
Name of the activity	Reaction of metals and non metals with acids
Objectives	To explain the concept of reaction with acid
Type of activity	Presentation
Material required for the activity	Hydrochloric acid,sulphuric acid,Mg,Al,Fe,Cu metals,coal,sulphur,test tubes,match stick
Detail of activity	Take samples of metals and non metals listed in table in separate test tubes &label them as A,B,C,D,E,F.With the help of a dropper add 5ml of.dil.Hcl to each test tube one by one.Observe the reactions carefully If no reaction occur,warm the test tube. Bring a burning match stick near the mouth of test tube.Repeat the activity with dil.sulphuric acid.

Record the observation	Students are asked to fill the observation in the given table & give a presentation in the next period.
Any Precaution	Keep the mouth of the test tube away from your face. Use test tube holder to hold the test tube holder.
TABLE FOR RECORDING	OBSERVATIOnS

TEST TUBE LABEL	Metal/Non metal	Reaction with Dilute hydrochloric acid		Reaction with dilute Sulpuric acid	
		Room temperature	Warm	Room temperature	Warm
A	Magnesium				
B	Aluminium (foil)				
C	Iron (filling)				
D	Copper(peeled flexible wire)				
E	Charcoal(powder)				
F	Sulphur(powder)				

HINTS-Magnesium, charcoal&sulphur does not react with both the acids.

-Al&Fereact to produce hydrogen gas.

-Copper does not react with Hcl.but react to produce Hydrogen with dil.Sulpuric acid.

*Non- metals generally do not react with acids ,but metals react with acids and produce hydrogen gas that burns with a pop sound on bringing a burning a match stick near the mouth of the test tube

Minute to minute break up of period-7

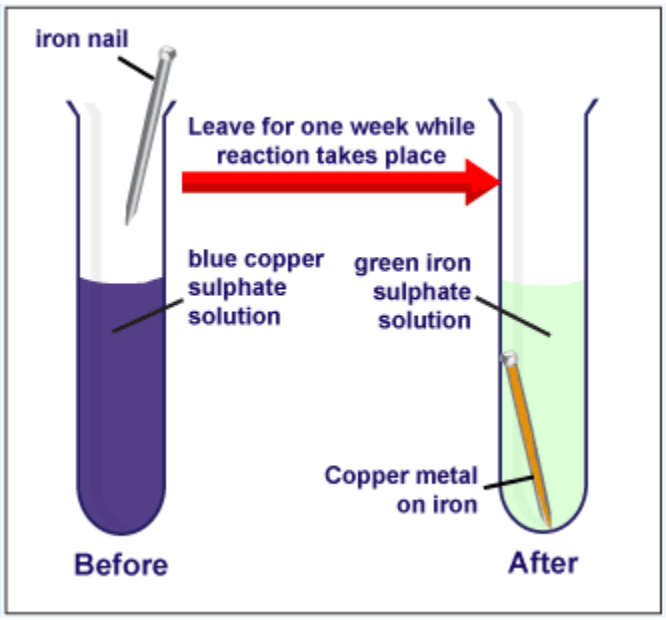
Student presentation	25 min	Teacher will give 3-4 minutes to eachgroup.Teacher will randomly choose 2 students from the group to make presentation. Teacher will note down the performance & would point out the positives of each presenter & guide with regard to the deficiency.
Discussion	10 min	Teacher will ask about good points of different groups & areas where improvement can be made
Home task	5min	Prepare index cards and write chemical properties of metals &non-metals.

Minute to minute break up of period-8

Concept of introduction of displacement reactions	10 mins	Teacher will explain the term displacement reaction &write it on the board .Activity 8 will be performed by the teacher by taking metals & their salt solutions.
Demonstration of activity	20mins	Teacher will ask –why the color of the sol. Change? Teacher explain that one metal displaces another metal from its salt solution .That is why the color changes. Teacher will tell that this reaction is used in metallurgies.
Careers options	5 min	Scientist,metal industry
Reactivity series	5 mins	Teacher will write the displacement reactions on the board &explain that zinc is more reactive than copperand more reactive metal canreplace less reactive metal.

Hint –reactivity series-the arrangement of metals in the decreasing order of their chemical reactivity is known as activity series.

ANNEXURE NAME	GA-8
Name of the activity	Displacement Reactions
Objectives	To explain the concept of displacement reaction
Type of activity	Demonstration by teacher
Material required for the activity	Copper sulphatesotution ,iron sulphate,zinc granule,iron nail,copperturnings,five 100 ml beakers
Details of the activity and detailed instructions to carry it out	Take about 50ml of water in a test tube dissolve 5g of copper sulphate in it.Add a few clean iron nails to the soln and keep the test tubeundisturbing for some time.We observe that the blue colour of the solution starts fading gradually.At the same time,iron nails get a shiny coating of red bron copper sulphate on their surfaces.This change takes place as

	irondisplaces copper from copper sulphate.Copper separated from its compound forms a coating on the iron nail.Following displacement reaction takes place. $Fe + CuSO_4$ ---→$FeSO_4 + Cu$ Iron copper iron copper sulphatesulphate
Pictures if any	
Explanation of outcome of the activity	Reaction takes place in the test tubes show that a highly reactive metal only can displace a less reactive metal from its salt solution. **Zn> Fe**. More examples can be taken if necessary

Minute to minute break up of period-9

Discussion of uses of metals & nonmetals	25mins	Teacher will explain& discuss the uses of metals and non metals&write them on the board. -
Interesting facts about metals&non-metals	10	*Gold is a shiny &does not corrode; it means it is a great metal for making jewelry. *The chemical symbol of silver is Ag; this comes from the Latin word silver argentums. *At room temp., mercury is the only metal which is liquid. *Iron in the human body has a number of important functions. *Deficiency of iron causes a disease anemia Non metals— *Carbon is a non metal present in all living things. Most abundant non metal present in human bodyas fallows- Oxygen 65% Carbon 18% Hydrogen 10% Nitrogen 03% Phosphorous 01% Sulphur 0.26% Chlorine 0.14%
Home task	5	Mark the places in the map of India where the deposits of metals are found.

I. Hint –metals are used in T V sets, cartools, mobile phones,& other gadgets.
II. Metals are used in batteries. Lithium ion battery is used in laptops &I pads.
III. Steel is an alloy of iron & other metals with carbon added for hardness.

Uses of nonmetals

1. hydrogen for hydrogenation of vegetable oil
2. Carbon –coal as a fuel
3. Coke in metallurgy.
4. Graphite in electrodes
5. Diamond as a gem.
6. Nitrogen –for manufacturing of urea.
7. Iodine –as an antiseptic.

Minute to minute break up of period -10

The whole lesson will be revised &explained accordingly-

- ✓ Sodium & potassium are stored in kerosene oil.
- ✓ An alloy of gold, cast gold is often used in teeth filling.
- ✓ Phosphorous is stored under water it catches fire when it is exposed to air.
- ✓ When iron nail is dipped in a blue colored copper sulphate solution its color changes to green due to displacement reaction.
- ✓ Alloys are homogeneous mixture of metals with metals or nonmetals.
- ✓ Metals react with acids and produce metal salts and hydrogen gas.
- ✓ Some metals react with bases to produce hydrogen gas.
- ✓ More reactive metals displace less reactive metals from their compounds in aqueous solutions.

**Back exercise will be discussed..

Section- F content-

Ppt on metals & nonmetals atnemslank.wikispaces.com/file/view/metals.ppt

For properties of metals & nonmetals see ppt on-

powershow.com/view/58367-NDVhY/Properties_of_Metals_Nonmetals_and_Metalloids_powerpoint_ppt_presentation

Section –G list of possible activities-

Name of the concept/ skill / outcome	**Name of the possible activities**	**Reference of the annexure where the details of the activity have been given in the already specified format or reference to the webaddress**
A. Introduction to the chapter	1. identification of materials as metals & nonmetals	Details of activity along with the explanation at Annex GA1
B. Recap of the pre requisite knowledge	List of questions	Given in section C
C Concept1	Malleability	Annexure GA2
D. Concept2	Electrical conductivity	Annexure GA3
E.Concept 3	To find the chemical nature of rust	Annexure GA4
F.concept 4	Find chemical nature of sulphur oxide	Anneure GA5
G .concept 5	Reaction of metals with water	Annexure GA6
F,concept 6	Reaction of metals with acids bases	Annexure GA7
G. concept 7	Displacement reaction	Annexure GA8
E. Team skills	By group activity	
F. Creativity	By drawing diagrams	
G. ICT skills	By making presentation	
H. Presentation	By presenting presentation	

skills		
I. Research	by finding new related things	
J.Vocabulary	1. cross word	

Section –H model assessment of students-

60% assessment from the topic taught & 40% assessment from activity based questions.

Questions for 60% assessment.

- What is the physical appearance of metals & nonmetals?
- Can sulphur conduct electricity?
- Name the property in which metals can be beaten into thin sheets?
- What is ductility?
- How green color substance is deposited on the surface of copper vessels?
- What happens when iron nails are dipped in copper sulphate solution?
- Name a metal & a nonmetal which are highly reactive?
- Which metal is liquid at room temperature?
- What happens when metals reacts with water?
- Which gas is released when metal reacts with acids & bases?
- Which substance is used for water purification?
- What are displacement reactions?
- When iron nail is dipped in copper sulphate solution,the color of the solution get discharged,why?
- What is rust?

  40% assessment from activity based questions-
- How will you test the chemical nature of magnesium oxide?
- What happens when sodium comes in contact of air?
- How aluminum will react with dilHCl at room temperature?
- Is rust acidic or basic?
- Why the beaker is hot when sodium is kept in water?

- Why phosphorous is stored under water?
- What happens when coal piece is beaten with hammer?
- Which gas is formed when sulphur is burnt?

1.Can you store lemon pickle in an aluminium utensils?Explain.

2.Why copper can't displace zinc from its salt solution?

3.Why sodium and potassium are stored in kerosene?

4.Why aluminum foils are used to wrap food items?

5.Why immersion rods for heating liquids are made up of metallic substance?

6.One day Rita went to a jeweler's shop with her mother. Her mother gave old gold jewellary to the goldsmith to polish.Next day when they brought the jewelry back they found that there was a slight loss in its weight.Can you suggest for the loss in weight?

7.If you put one end of the rod of a metal in hot water,you feel hot at the other end.What does it mean?What is this property of metal called?

8.What property of metal make them useful as electric wires?

9.Why should foodstuff with acid component not be stored in metallic container?

10.Name a metal not attacked by cold water,boiling water or steam?

11.Name one metal that decomposes boiling water and not cold water?

12.Can copper displaces iron from iron sulphatesolution?Give reasons?

13.Why is tincture iodine applied on wounds?

14.Why is aluminum used in making airplanes?

15.In which form iron is used in big buildings?

16.Why is aluminum nowadays replacing copper for use in electrical cables?

17.Why are metals used in making machinery?

18.How much light is reflected by mirror coated with silver?

19.How many naturally occurring elements are?

20.Can you count naturally occurring metals?

Section- I

Assessment Tool for teachers:-

1) How a teacher can inculcate interest for the topic among student?

2) What is a proper method to aware the children about harmful effects of metals and non-metals?

3) How the correlation of usefulness of metals in our daily life can be established by a teacher?

4) How the teacher can aware his students about the health disorders caused by the heavy metals?

5) How a teacher can motivate the students about their role in cleanliness of the environment?

6) How the teacher can contribute in identifying the areas especially from Punjab suffering from heavy metals by taking the students alongwith?

7) How the students can be made aware about the preventive measures to keep themselves away from ill effects of heavy metals?

8) How the students can be explained the need of metals in our day to day life?

9) How the students can be made aware about the Central Govt. spending more on preventive measures to stop ailments rather than better health infrastructure in India?

10) How a teacher can explain about different modes of transmission of heavy metals in our blood?

11) What effective measures are taken by the Local bodies such as Panchayats,Muncipalities to make the nation healthy?

12) How a teacher can explain prevention sometimes is better than cure?

13) How dangers of non-metals be minimized?

14) How to make children understand utility of non-metals in daily life?