

PERIODIC TABLE: METALS AND NON METALS TOPIC:METALS AND NON METALS CHEMISTRY 180 mins



Google Earth Education

LESSON TITLE: PERIODIC TABLE: METALS AND NON METALS

TIME 180 minutes

OVERVIEW - Students will be able to compare the physical and chemical properties of metals and non-metals using Google earth project and Expedition tool and design a solution that solves a practical problem by using characteristic chemical properties of pure substance.

SUBJECT/TOPIC Physical and Chemical Properties of Metals and Non Metals CHEMISTRY	AGE LEVEL 13-14
 Learning Objectives Students will be able to Observe and describe the appearance of metals and nonmetals. Record observations about metals and nonmetals Label simple elements as metals, nonmetals. Describe properties of metals and nonmetals. Understand the uses of metals and nonmetals in day to day life. 	Inquiry How are the physical and chemical properties of metals and non-metals different?
 Materials Needed Laptop, Internet, Google Earth samples (iron nail, copper wire, magnesium ribbon, aluminum vessel, graphite or pencil lead, charcoal, wood, glass) Small hammer Conductivity apparatus Torch metal spoon Sand paper Mg ribbon. A pair of Tongs HCl acid Vinegar Aluminum foil Zn powder NaOH (drain clog removers) Ice cubes Copper wire Small Bulb Battery Match box Cutter Small glass bottle Litmus paper(red and blue) 	 Lesson Summary Engage: Students to observe the given material carefully and organize them in 2 different groups based on following activities and on their similarities.students investigate the evolution of the periodic table and the people who made discoveries Explore: Students to explore Google VR expedition tool to observe the periodic table and understand how metals and non metals are placed according to their properties. Explain: Research on why they think that is a good way to group the items based on chemical reactions and not on basis of physical properties. Revise: Discuss the experimental results in small groups Apply: Students find out the different metals and nonmetal from their surrounding and their uses.and prepare a google earth project on it emphasizing on its discovery, history, ore mining and uses.

4 CUALITY Image: Comparing the second sec	Culminating Task/Assessment Students will work collaboratively to make a video of the google earth presentation using screen recording software differentiating between Metals and Non metals on the basis of physical and chemical properties.

Textbook NCERT Chapter Std VIII- Metals and Non metals

Engage (15 minutes)

Students will be asked a series of questions such as....

1. How would you describe a metal? The opposite of that would be a nonmetal.

2. So how can you describe a nonmetal?

3. What do you think these words mean? Luster? Conductor? Malleable? Ductile? Brittle? Dull?

The words will then be explained to the students.

4. The students will examine the following items that are in containers..... gold (ring), silver (chain), aluminum (can), copper (wire), iron (pan), carbon, oxygen, silicon, sulfur, and chlorine.

5. They will be asked to compare them and contrast them.

They will be asked to put them into two groups based on their differences.

Explore (25 minutes)

1. Students to explore Google VR expedition tool to observe the periodic table and understand how metals and non metals are placed in periodic table.

Teacher can provide 2 metal samples and 2 nonmetal samples given above to each group for all below activities. (For ex. Copper wire, iron nail, wood and charcoal.)

- 1. Ask to see reflection of torch lightwith given material
- 2. Ask to beat given material with hammer.
- 3. Ask the student to try and bend the materials
- 4. Asks the students to strike the given materials with a metal spoon
- 5. Ask the students to scrap the given samples. Is the surface underneath the same in appearance or different?
- 6. Keep the ice on Aluminum foil and some ice on Charcoal. Which Ice gets melt?

7.Hold the normal battery or cell on Charcoal and on Aluminum Foil For 2 – 3 min. Battery in contact with aluminum foil will heated up.

2. Students note down thhe experiment result and then frame their hypothesis.

Explain (20 minutes)

- 1. Teachers organize students into small groups or partners.
- 2. Students share first "hypothesis" with small group or a partner.
- 3. Teachers facilitate whole group discussion in which students share their hypotheses and evidence.
- 4. The students will explain how the items are grouped on the basis of physical properties.
- 5. Students will explain why they think that is a good way to group the items based on physical properties

Revise (10 minutes)

1. Each group will prepare a crossword and give it to other groups for solving.

Next, repeat the process with a second source of information.

Explore (60 minutes)

students to work in pairs or groups for this activity. The students will do a lab to compare the properties of metals and non-metals through activity.

Activity 1

1. Take dilute hydrochloric acid in the glass bottle/ test tube.

2. Put some iron filings or zinc dust in the balloon 1 and Sulphur in Balloon 2.

3. Fix the balloon on the mouth of the glass bottle so that the iron filings and Sulphur gets dropped in the glass bottle.

What do you notice? Which balloon inflates?

4. Remove the balloon carefully and tie its mouth tightly without letting the gas escape.

5. Release the balloon. Does it rise and float away? What does this indicate? Is the gas trapped in the balloon lighter or heavier than air? Which gas could it be?

In the above activity you allowed metal iron to react with an acid. What happens when metal

carbonates and bicarbonates react with acids? Let us find by doing an activity.

Activity 2

Take 2mLof vinegar in a glass bottle.

Take a pinch of baking soda in a balloon.

Fix this balloon on the mouth of the glass bottle so that baking soda gets dropped in the glass

bottle. Do you notice bubble formation? What happens to the balloon? Remove the balloon and tie its mouth tightly without letting the gas escape.

Release the balloon. Does it rise and float away? Does it behave the same way as the first gas filled balloon in the first case? Is this gas heavier or lighter than air?

Activity 3

.Reaction of metal with oxygen (forms metal oxides which are basic in nature)

Demonstrate the burning of Mg ribbon (metal)

Hold the piece of magnesium metal ribbon in a pair of tongs.

Take the burner and hold the magnesium metal ribbon in the hottest part of the flame.

It will soon catch fire and emit a very bright light.

Collect the white ash and 4-5 drops of water. Mix well.

5.After shaking, test the solution with

blue litmus and red litmus.

Activity 4

Reaction of nonmetal with oxygen (forms oxides which are acidic in nature)

Demonstrate the burning of Phosphorus (nonmetal)

- 1. Scrub the red phosphorus present on match box red striker pads.
- 2. Burn the small amount ofred phosphorusand collect the gas evolved in a test tube.
- 3.Add a few drops of water in the test tube containing gas. Now, cover the test tube and shake it well.
- 4. After shaking, test the solution with blue litmus and red litmus.

Activity 5

Reaction of metal with water

(produce hydroxide and hydrogen)

Demonstrate the reaction of Magnesium with water.

- 1. Take small piece of clean Mg ribbon in a test tube.
- 2. Add small amount of water and boil it.
- 3. After 3-4 min of boiling add 2 drops of phenolphthalein.
- 4. The solution turns pink due to basic magnesium hydroxide Activity 6

1. Reaction of metals with Acids (produce salt and hydrogen)

- 2. Demonstrate the reaction of Aluminium with HCl or Vinegar
- 3. Add few pieces of Aluminium Foil in HCl or in vinegar.
- 4. Test the production of Hydrogen gas
- 5. Collect the evolved gas in an inverted test tube and bring burning candle near the test tube.
- 6. Hydrogen burns with pop sound.

Activity 7

- 1. Reaction of metals with Base
- 2. Add small piece of Al foil in NaOH (can use drain clog removers use to clean kitchen pipes which contain NaoH.

Explain (20 minutes)

- 1. Teachers organize students into small groups or partners.
- 2. Students share first "hypothesis" with small group or a partner.
- 3. Observe the reaction and note the result. What happens? Which gas is it?
- 4. Write down the reaction involved in it
- 5. Students will note down the experiment results and share.
- 6. Students will try to write word equations in groups.
- 7. Students will be shown the grouping of the items by metals and non-metals.
- 8. The lesson will be related back to their vocabulary words.

The reactions of metals with acids have some important implications in daily life. Certain food stuffs like citrus fruit juices, pickles, chutney and curd contain acids. What happens when foodstuffs containing acids are kept in Iron, Aluminum or Copper containers?

Milk was originally delivered in glass bottles and now in cartons. What factors go in to decisions about changing what materials should be used when building a product

9. Uses of metals

Revise (10 minutes)

- 1. Students will discuss their findings with other group members.
- 2. Discuss these questions in groups
- 1. Into what 3 categories are the elements on the periodic table organized?
- 2. What are some properties of metals?
- 3. What are some properties of nonmetals?
- 4. Are there any questions about what we discussed today?

(Option to repeat this process with additional sources of information, each time resulting in an updated hypothesis.)

Apply (20 minutes)

- 1. Examine the following objects or machines that you use every day:
- a) Backpack b) bicycle c) car

2. Make a list of the metals and nonmetals that make up the major components of the object. List the function and characteristics of each component.

3. The way materials are used can change with time. Milk was originally delivered in glass bottles. Now cartons made from wax-coated paper and plastic jugs are used for milk. Snow skis used to be made of wood. Now they are made from fiberglass or graphite. What factors go into decisions about changing what materials should be used when building a product?

Evaluate: Exemplar Response and/or Rubric

Students to complete the following table based on above activity.

Pro	operties	Metals	Non-metals
1.	Appearance		
2.	Hardness		
3.	Malleability		
4.	Ductility		
5.	Heat Conduction		
6.	Conduction of Electricity		

Group Presentation Rubric

The teacher will use this rubric to evaluate each group's presentation. Students can look at this rubric so they may understand what they are being graded on. The Group Presentation Rubric will be combine with the Teammate Participation Rubric to determine your final grade for the project.

Trait		Crite	eria		Points
	1	2	3	4	
Content Did the presentation have valuable material?	Presentation contained little to no valuable material on Physical and	Presentation had moments where valuable material on Physical and Chemical properties of	Presentation had a good amount of material on ores, mining, word rections on chemical	Presentation had an exceptional amount of valuable material on history of periodic table elements,physical	

	Chemical properties of metals and non metals	metals and non metals was present but as a whole content was lacking.	properties of metals and non metals and benefited the class.	and chemical properties of metals and non metals. and was extremely beneficial to the class.	
Collaboration Did everyone contribute to the presentation? Did everyone seem well versed in the material?	The teammates never worked from others' ideas. It seems as though only a few people worked on the presentation.	The teammates sometimes worked from others' ideas. However it seems as though certain people did not do as much work as others.	The teammates worked from others' ideas most of the time. And it seems like every did some work, but some people are carrying the presentation.	The teammates always worked from others' ideas. It was evident that all of the group members contributed equally to the presentation.	
Organization Was the presentation well organized and easy to follow?	The presentation lacked organization and had little evidence of preparation.	There were minimal signs of organization or preparation.	The presentation had organizing ideas but could have been much stronger with better preparation.	The presentation was well organized, well prepared and easy to follow.	
Presentation Did the presenters Speak clearly? Did the engage the audience? Was it obvious the material had been rehearsed?	Presenters were unconfident and demonstrated little evidence of planning prior to presentation.	Presenters were not consistent with the level of confidence/ preparedness they showed the classroom but had some strong moments.	Presenters were occasionally confident with their presentation however the presentation was not as engaging as it could have been for the class.	Presenters were all very confident in delivery and they did an excellent job of engaging the class. Preparation is very evident.	

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Additional Resources

• <u>https://en.wikipedia.org/wiki/Properties_of_metals,_metalloids_and_nonmetals</u> <u>https://www.youtube.com/watch?v=64LMt9iUflU</u>

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Options for Differentiation

• Research on the scientists who contributed in the discovery of the elements of periodic table.

Credits

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