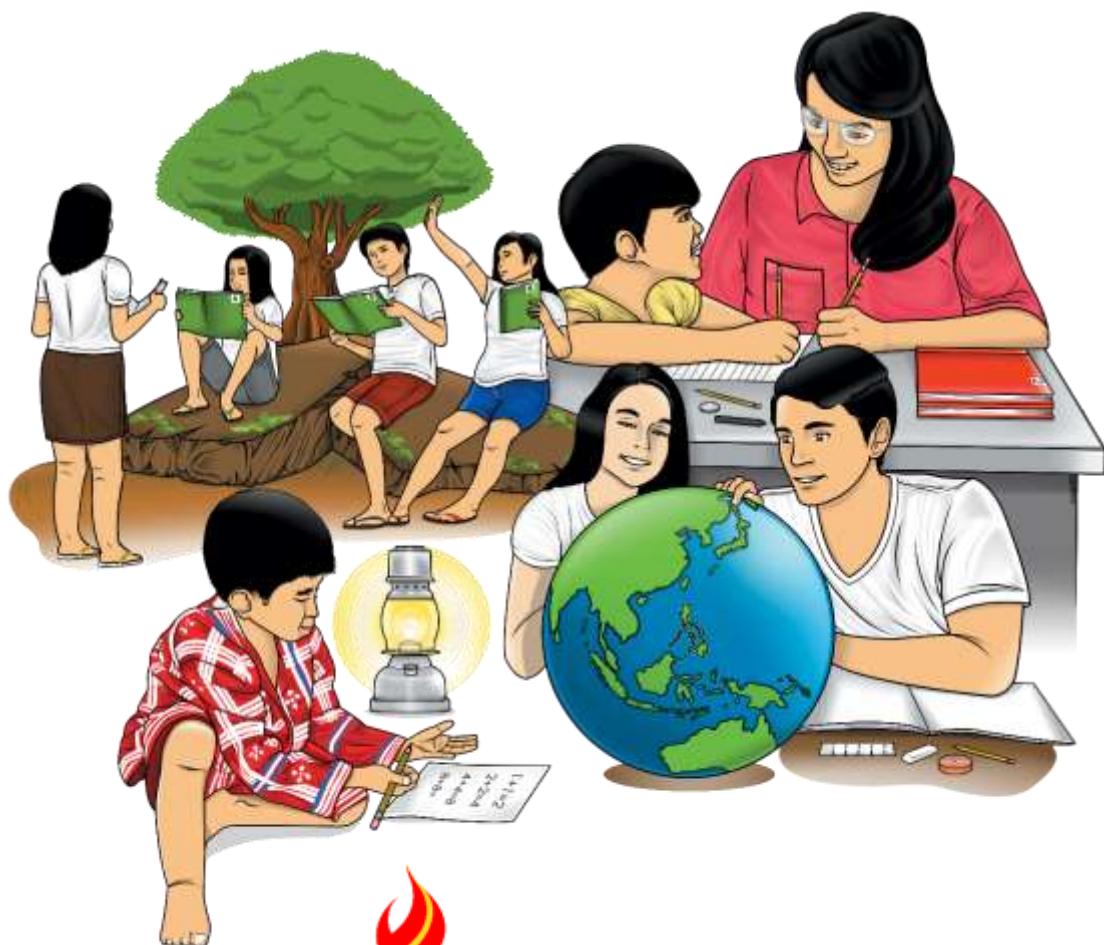


Science

Quarter 3 – Module 4: Periodic Table of Elements



Science – Grade 8

Alternative Delivery Mode

Quarter 3 – Module 4: Periodic Table of Elements

First Edition, 2020

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Secretary: Leonor Magtolis Briones

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Development Team of the Module

Writers: Elvin O. Belsondra, Mefrel M. Baquial and Marjorie Y. Junio

Editor: Mary Luz B. Advincula-Niere

Reviewers: Bernabe L. Linog, Edna E. Trinidad, Jane C. Basul, Kevin Hope Z. Salvaña,
Romeo A. Villarin, Alfonz Lexie John C. Basul, Myra Joy B. Montero and
Pamela Lou C. Suazo

Illustrator: Rosa Mia L. Pontillo

Layout Artist: Edgardo Pamugas III

Layout Evaluators: Celeste Faith R. Almanon, Jay S. Ayap

Management Team: Francis Cesar B. Bringas
Isidro M. Biol, Jr.
Maripaz F. Magno
Josephine Chonie M. Obseñares
Gregoria T. Su
Marilyn C. Francia
Jay S. Ayap
Nonita C. Patalinghug

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Department of Education – Caraga Region

Office Address: Teacher Development Center
J.P. Rosales Avenue, Butuan City, Philippines 8600
Telefax: (085) 342-8207/ (085) 342-5969
E-mail Address: caraga@deped.gov.ph

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Science
Quarter 3 – Module 4:
Periodic Table of Elements



Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



What I Need to Know

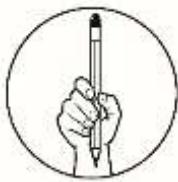
This module was designed and written with you in mind. It is here to help you master the arrangement of elements, the reactive and nonreactive metals. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module contains:

- **Lesson 1** - Arrangement of Elements
- **Lesson 2** - Reactive and nonreactive metals

After going through this module, you are expected to:

1. Identify the groups and periods of the elements;
2. Describe metals, nonmetals, and metalloids;
3. Compare the relative reactivity of metals; and
4. Use the Periodic Table of Elements to predict the chemical behavior of an element. (*MELC Week 7-8 S8MT-IIIi-j-12*)



What I Know

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Which term is used to the vertical columns of the periodic table?
 - A. group
 - B. line
 - C. rows
 - D. table
2. What are Group 1 elements known as?
 - A. Alkali metals
 - B. Transition elements
 - C. Representative elements
 - D. Inner transition elements
3. Which element is found in period 6, group 4?
 - A. Cr
 - B. Hf
 - C. Pb
 - D. Ti
4. Elements in the same group have the same number of _____.
 - A. protons
 - B. neutrons
 - C. electrons
 - D. valence electrons
5. In which period and group is Silver (Ag) located?
 - A. Period 2, Group 1
 - B. Period 3, Group 8
 - C. Period 4, Group 2
 - D. Period 5, Group 11
6. How are elements arranged in the Periodic Table?
 - A. increasing atomic radii
 - B. increasing atomic masses
 - C. decreasing atomic masses
 - D. increasing atomic numbers

7. Why do elements of the same group have similar chemical properties?
- A. They have different atomic masses.
 - B. They have one electron in the outer shell.
 - C. They have different number of electrons in the outermost shell.
 - D. They have the same number of electrons in the outermost shell.
8. In which arrangement of elements will reactivity generally become lesser?
- A. left to right
 - B. bottom to top
 - C. top to bottom
 - D. both A and B

For questions, 9-11, use the list of elements in decreasing order of reactivity as shown in the box.

K, Na, Ca, Mg, Zn, Fe, H, Cu

9. Which statement about the reactivity of these metals is correct?
- A. Zinc is less reactive than Iron.
 - B. Sodium is less reactive than Calcium.
 - C. Copper is more reactive than Potassium.
 - D. Calcium is more reactive than Magnesium.
10. Based on the reactivity series, which metal is the most reactive?
- A. Copper
 - B. Lithium
 - C. Sodium
 - D. Zinc
11. Which of the following sets of metals is arranged according to increasing reactivity?
- A. K, Mg, Na, Li
 - B. Mg, Li, Na, K
 - C. Mg, Na, Li, K
 - D. Na, Li, Mg, K
12. Which one of the following metals reacts most vigorously with cold water?
- A. Copper
 - B. Iron
 - C. Magnesium
 - D. Sodium
13. Which set of substances would allow rusting to take place the fastest?
- A. Iron, salt and water
 - B. Steel, salt and water
 - C. Steel, salt and weak acid
 - D. Iron, salt and weak acid

14. If the metal is more reactive, the metal in the compound replaces the less reactive metal. Based on this, which of the following statements is true?

- A. The less reactive metal repels the more reactive metal from its compound.
- B. The more reactive metal bonds with the less reactive metal from its compound.
- C. The more reactive metal pushes out or displaces the less reactive metal from its compound.
- D. The less reactive metal pushes out or displaces the more reactive metal from its compound.

15. Which metal is preferred to be used for water pipes? ~~because it is unreactive?~~

- A. Copper
- B. Gold
- C. Iron
- D. Potassium

**Lesson
1**

Arrangement of Elements

All the known chemical elements are arranged on The Periodic Table of Elements in an informative array. There are already 118 elements discovered as of 2019. These elements are arranged from left to right and from top to bottom in an increasing order of atomic numbers.

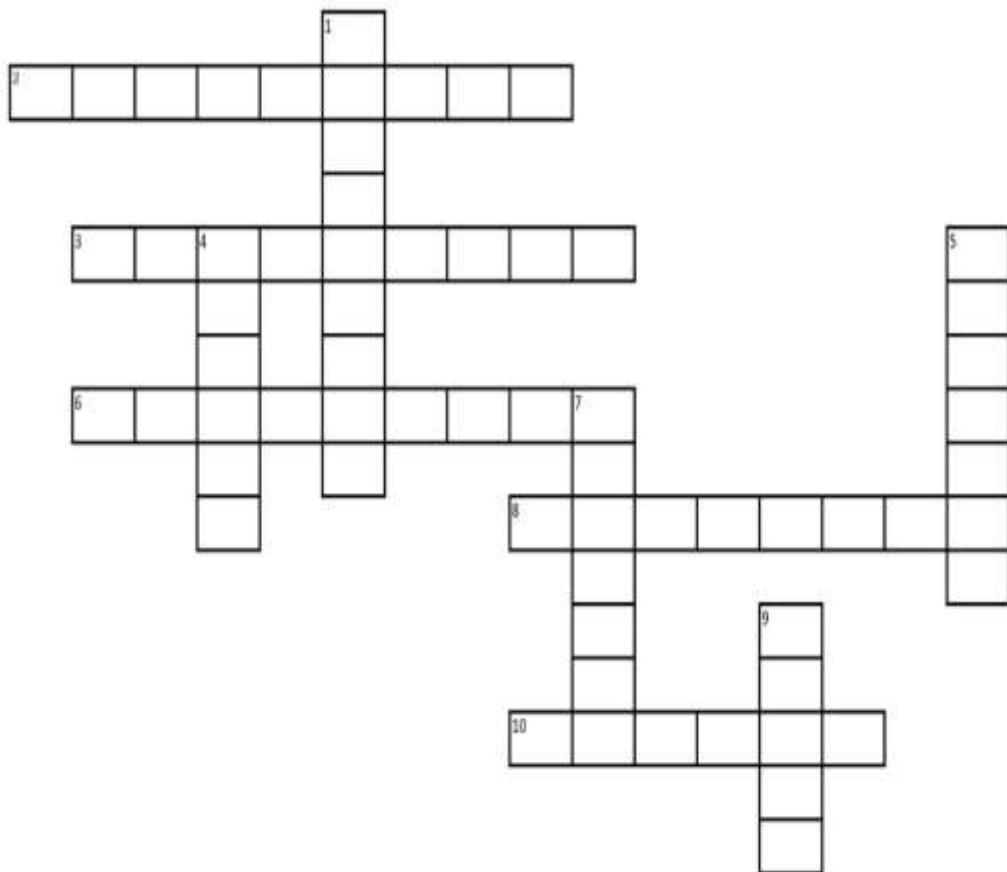
This lesson will help you find out more about the properties of elements. You will see that majority of them are metals, some are non-metals, and few are metalloids.



What's In

Activity 1. Crossword Puzzle

Directions: Complete the crossword puzzle below. Write your answers on a separate sheet of paper.



Across

2. They are elements in Group 16.
3. A property of metal that is capable of being hammered into thin sheets without breaking.
6. An element that has the properties of metals and nonmetals.
8. It is a series of radioactive metallic elements.
10. It is the horizontal row of the Periodic Table of Elements.

Down

1. They are generally poor conductors of heat and electricity.
4. It refers to the brightness that a shiny surface has.
5. It is the name of the group of very reactive nonmetals and often used as disinfectant.
7. It is a physical property that is able to draw out into a thin wire.
9. The column of elements on the periodic table



What's New

Activity 2, 4 Pics One Word

Directions: Reveal the word by analyzing the given set of pictures and letters. Write your answers on a separate sheet of paper.

1.

The image contains the following elements:

- A small rectangular card for Helium (He) with atomic number 2, symbol He, name Helium, and atomic mass 4.0026.
- Four small circular icons labeled 'Fire', 'Water', 'Earth', and 'Wind'.
- A large, dark, irregularly shaped rock or mineral specimen.

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E M T

2.

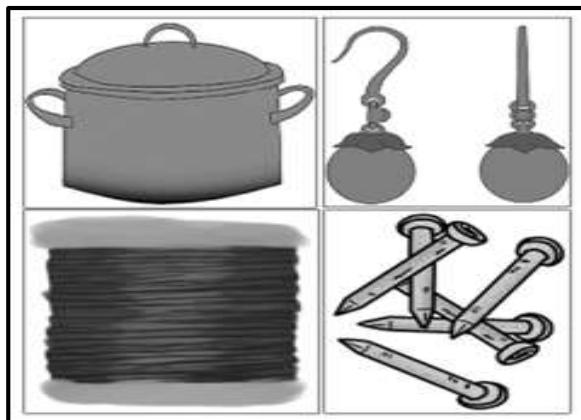
The image contains the following elements:

- A detailed illustration of a DNA double helix.
- An illustration of a tree where each leaf is a face of a person.
- A scene of a couple sitting on a blanket in a park.
- A group of people seated around a table, possibly at a meal.

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P R

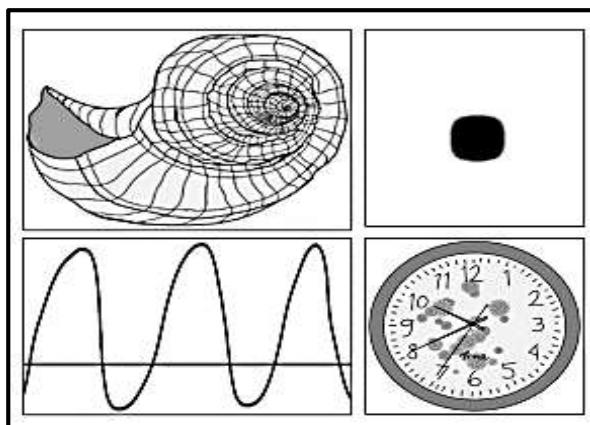
3.



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M — — — —

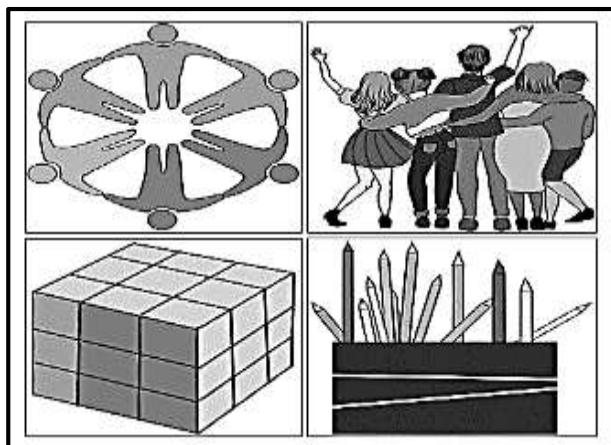
4.



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P **R** — — — —

5.



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G — — — — **P**



What is It

Arrangement of Elements

Figure 1 shows the elements on the modern periodic table which are organized based on similarities of properties of elements.

1 IA H	2 IIA Be													13 IIIA B	14 IIIA C	15 VA N	16 VIA O	17 VIIA F	18 VIIIA Ne
3 Li	4 Be	5 VB	6 VIB	7 VIIB	8 VIII	9 VIII	10	11	12	13	14	15	16	17	18	19	20		
Na	Mg	3B 3B	4B 4B	5B 5B	6B 6B	7B 7B	8B 8B	9B 9B	10B 10B	11B 11B	12B 12B	13B 13B	14B 14B	15B 15B	16B 16B	17B 17B	18B 18B		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
Cs	Ba	57-71	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
Fr	Ra	89-103	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og		
Lanthanide series																			
Actinide series																			
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu					
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr					

Illustrated by Rosa Mia L. Pontillo

Figure 1. The Periodic Table of Elements

Figure 2 shows the horizontal rows of the periodic table, called **periods**.

1 IA H	2 IIA Be													13 IIIA B	14 IIIA C	15 VA N	16 VIA O	17 VIIA F	18 VIIIA Ne
3 Li	4 Be	5 VB	6 VIB	7 VIIB	8 VIII	9 VIII	10	11	12	13	14	15	16	17	18	19	20		
Na	Mg	3B 3B	4B 4B	5B 5B	6B 6B	7B 7B	8B 8B	9B 9B	10B 10B	11B 11B	12B 12B	13B 13B	14B 14B	15B 15B	16B 16B	17B 17B	18B 18B		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
Cs	Ba	57-71	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
Fr	Ra	89-103	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og		
Lanthanide series																			
Actinide series																			
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu					
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr					

Illustrated by Rosa Mia L. Pontillo

Figure 2. Elements in Period 5

The vertical columns of the periodic table are called **groups** or **families** as illustrated in figure 3. The group number corresponds to the number of electrons in their outermost shell. These outermost electrons are called **valence electrons**. The elements in group of the periodic table have similar chemical properties.

The diagram shows a standard periodic table with the following features:

- Groups:** Lanthanides (Ce-Lu) and Actinides (Ac-Lr) are shown as separate rows below the main body of the table.
- Periods:** The main body of the table has 7 periods, each containing 18 elements.
- Groups:** Groups 13 through 18 are highlighted with a light blue background. Group 13 (B, Al, Ga, In, Tl) is in period 3. Group 14 (C, Si, Ge, Sn, Pb) is in period 4. Group 15 (N, P, As, Sb, Bi) is in period 5. Group 16 (O, S, Se, Te, Po) is in period 6. Group 17 (F, Cl, Br, I, At) is in period 7. Group 18 (Ne, Ar, Kr, Xe, Rn) is in period 8.
- Elements:** Each cell contains the element symbol, atomic number, and name.
- Group Labels:** The groups are labeled at the top of the table: 1 IA, 2 IA, 3 IA, 4 IA, 5 IA, 6 IA, 7 IA, 13 VA, 14 VA, 15 VA, 16 VA, 17 VA, 18 VA.

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Figure 3. Elements in Group 13

FEATURES OF GROUPS or FAMILIES OF ELEMENTS

Elements from the taller columns which are the Groups 1, 2, and 13 through 18 are called **representative elements** or main groups of the periodic table.

Group 1: Alkali Metals

- very reactive, soft, malleable, and ductile
- good conductors of heat and electricity
- with only one valence electron

1	H	Hydrogen	1.008
3	Li	Lithium	6.941
11	Na	Sodium	22.990
19	K	Potassium	39.098
37	Rb	Rubidium	85.468
55	Cs	Cesium	162.905
87	Fr	Francium	223.020

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Figure 4. Group 1,
the Alkali Metals

Group 2: Alkaline Earth Metals

- second most reactive elements
- malleable, ductile, and good conductors of heat and electricity but not as soft as Group 1 elements
- with two valence electrons

4	Be	Boron	9.012
12	Mg	Magnesium	24.320
20	Ca	Calcium	40.078
38	Sr	Samarium	87.65
56	Ba	Boron	172.034
88	Ra	Radium	226.020

Illustrated by Rosa Mia L. Pontillo

Figure 5. Group 2.

Group 13: Boron Group

- are post-transition metals, except for Boron which is a metalloid and Nihonium which is a synthetic chemical element that is extremely radioactive
- with three valence electrons

5	B	Boron	10.81
13	Al	Aluminum	26.982
31	Ga	Gallium	69.723
49	In	Indium	114.28
81	Tl	Thallium	204.393
101	Nh	Nihonium	(286)

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Figure 6. Boron
Group

Group 14: Carbon Group

- also known as the Carbon family, or the tetrels
- elements in this family are the key importance for semiconductor technology
- with four valence electrons

6	C	Carbon	12.01
14	Si	Silicon	28.095
32	Ge	Germanium	72.631
50	Sn	Tin	118.71
62	Pb	Lead	207.2
74	Fl	Florium	(286)

Illustrated by Rosa Mia L. Pontillo

Figure 7. Carbon
Group

Group 15: Nitrogen Group

- known as Pnictogen group
- with five valence electrons

7	15	33	51	63	15
N Nitrogen 14.007	P Phosphorus 30.974	As Arsenic 74.922	Sb Antimony 121.760	Bi Bismuth 208.980	Mc Moscovium (289)
1s ² 2s ² 2p ³	1s ² 2s ² 2p ⁶ 3s ² 3p ³	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ³	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 4d ¹⁰ 5p ³	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 5p ¹

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Figure 8. Nitrogen group

Group 16: Chalcogens

- Chalcogen is the new trivial name recognized by the International Union of Pure and Applied Chemistry
- widely known as Oxygen group
- generally nonmetals
- with six valence electrons

8	16	34	52	64	76
O Oxygen (15.999)	S Sulfur (32.066)	Se Selenium (78.971)	Te Tellurium (127.6)	Po Polonium (208.982)	Un Unknown (293)
1s ² 2s ² 2p ⁴	1s ² 2s ² 2p ⁶ 3s ² 3p ⁴	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁴	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 4d ¹⁰ 5p ⁴	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 5p ⁶	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 5p ⁶ 6s ¹

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Figure 9. The Chalcogen Family

Group 17: Halogens

- salt former
- exist in all three states of matter
- with seven valence electrons

9	17	35	53	75	85	17
F Fluorine (18.998)	Cl Chlorine (35.453)	Br Bromine (79.904)	I Iodine (126.904)	At Astatine (209.967)	Ts Tennessine (294)	Un Unknown (293)
1s ² 2s ² 2p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 4d ¹⁰ 5p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 5p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 5p ⁶ 6s ¹	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰ 4p ⁶ 5s ² 5p ⁶ 6s ²

Illustrated by Rosa Mia L. Pontillo

Figure 10. The Halogen Family

Group 18: Noble Gases

- stable gases
- non-reactive or inert elements
- with eight valence electrons except Helium

2	10	18	36	54	76	18
He Helium (4.003)	Ne Neon (20.180)	Ar Argon (39.948)	Kr Krypton (83.788)	Xe Xenon (131.204)	Rn Radium (222.018)	Og Oganesson (293)
1s ²	1s ² 2s ²	1s ² 2s ² 2p ⁶	1s ² 2s ² 2p ⁶ 3s ²	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ²	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ¹⁰

Illustrated by Rosa Mia L. Pontillo

Figure 11. The Noble Gases Family

Groups 3-12: Transition Metals

- hard (with Mercury as an exception)
- malleable, ductile, and good conductors of electricity
- with one and/or two valence electrons

3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIIB 7B	8	9 VIII 8	10	11 IB 1B	12 IIB 2B
Sc Scandium 44.96	Ti Titanium 47.88	V Vanadium 50.94	Cr Chromium 51.98	Mn Manganese 54.94	Fe Iron 55.845	Co Cobalt 58.933	Ni Nickel 58.693	Cu Copper 63.546	Zn Zinc 65.38
Y Yttrium 88.900	Zr Zirconium 88.204	Nb Niobium 91.905	Mo Molybdenum 95.967	Tc Technetium 98.907	Ru Ruthenium 101.07	Rh Rhodium 102.906	Pd Palladium 102.42	Ag Silver 107.866	Cd Cadmium 112.431
57-71	Hf Hafnium 178.49	Ta Tantalum 180.148	W Tungsten 183.85	Re Rhenium 190.207	Os Osmium 190.23	Ir Iridium 192.22	Pt Platinum 195.08	Au Gold 196.967	Hg Mercury 200.591
89-103	Rf Rutherfordium 261	Db Dubnium 262	Sg Sgadolinium 263	Bh Bohrium 264	Hs Hassium 265	Mt Meitnerium 268	Ds Darmstadtium 289	Rg Roentgenium 289	Cn Copernicium 289

Illustrated by Rosa Mia L. Pontillo

Figure 12. Transition metals

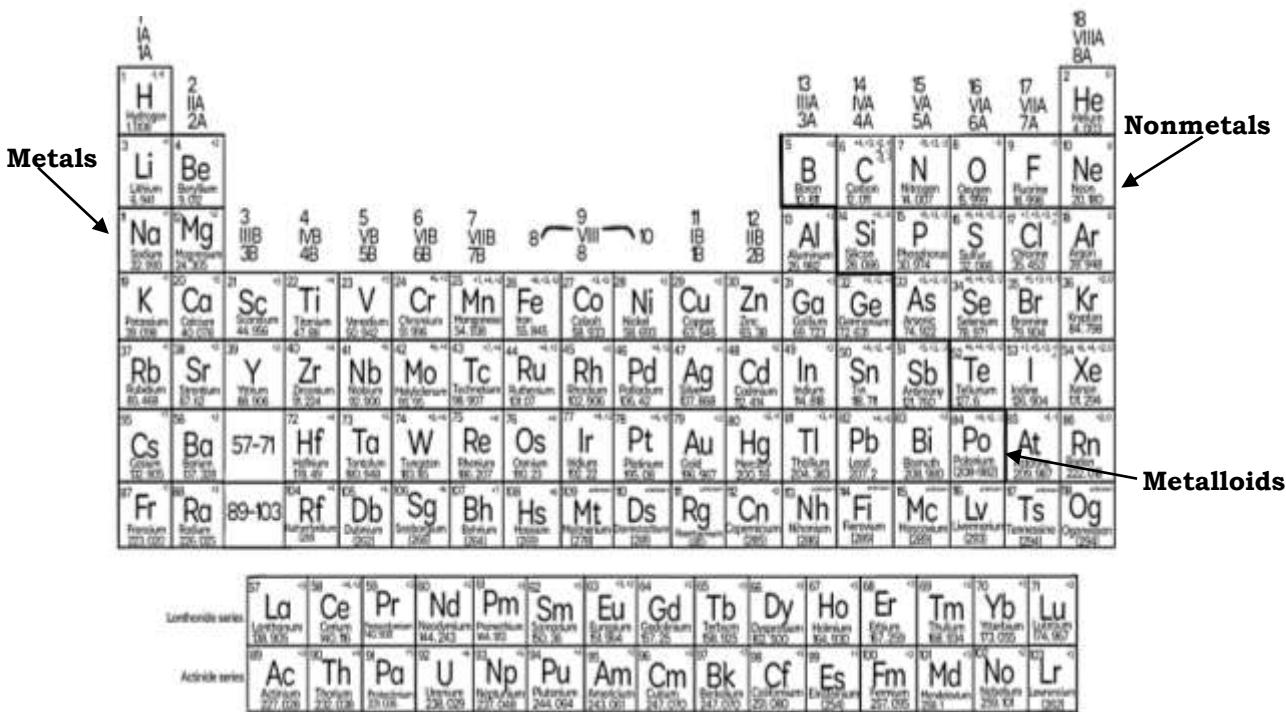
Figure 13 shows the **lanthanides** and **actinides** series. They are special series of elements but are also part of the transition block. They are also called the **inner transition elements**.

Lanthanide series	La Lanthanum 57.002	Ce Cerium 140.119	Pr Praseodymium 141.007	Nd Neodymium 144.243	Pm Promethium 144.193	Sm Samarium 150.390	Eu Europium 151.904	Gd Gadolinium 157.912	Tb Terbium 158.912	Dy Dysprosium 160.930	Ho Holmium 164.939	Er Erbium 167.939	Tm Thulium 169.939	Yb Ytterbium 173.050	Lu Lutetium 174.967
Actinide series	Ac Actinium 227.028	Th Thorium 232.038	Pa Protactinium 231.038	U Uranium 238.029	Np Neptunium 237.048	Pu Plutonium 244.064	Am Americium 243.061	Cm Curium 247.070	Bk Berkelium 247.070	Cf Californium 250.080	Es Einsteinium 252.014	Fm Fermium 257.056	Md Mendelevium 258.1	No Nobelium 259.011	Lr Lawrencium 259.025

Illustrated by Rosa Mia L. Pontillo

Figure 13. Lanthanides and Actinides Series

Metals, Nonmetals, and Metalloids



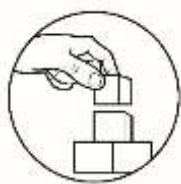
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Figure 14. Location of metals, nonmetals, and metalloids

In the above figure, **metals** are located on the left side of the Periodic Table of Elements. Most of the elements are metals which are solids at room temperature except Mercury. Elements that are found far right of the periodic table are called **nonmetals** which may be solids, liquids or gases. A stair-step line on the table separates the metals from nonmetals. The elements along this line are called **metalloids**. Metalloids exhibit the properties of metals and nonmetals. The seven elements commonly regarded as metalloids are silicon, germanium, arsenic, antimony, tellurium, and polonium.

Table 1. Summary of Properties of Elements

Classification of Elements	Properties
Metals	Lustrous (shiny), malleable, hard, ductile Good conductors of heat and electricity
Nonmetals	Dull in appearance, brittle Poor conductors of heat and electricity
Metalloids	Have some properties of metal but behave chemically like a nonmetal in certain instances Some are semiconductors, which means they will insulate and conduct electricity



What's More

Activity 3. The Missing Element

Directions: Fill in the missing information below by using the Periodic Table of Elements. Write your answers on a separate sheet of paper.

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Element Name	Symbol	Group Number	Period Number	Identify if Metal (M), Nonmetal (NM) or metalloid (Met)
Boron		13		
	Al		3	
Tin	Sn			
Helium		18		
	Ne	18		
	Ca		4	
Francium		1		
	Au		6	



What I Have Learned

Activity 4. Fill me Up!

Directions: Fill in the blanks with missing word/s. Write your answers on a separate sheet of paper.

Elements within the modern periodic table are organized in the simplest way so that information about the elements and their compounds are easily revealed. The vertical columns of the periodic table are called **1.**_____ It identifies the **2.**_____ of elements. The horizontal rows of the periodic table, called **3.**_____ are numbered from top to bottom.

There are 18 groups in the Periodic Table of Elements. Group 1 is named as Alkali Metals, Groups 2 as **4.**_____, and Group 16 as **5.**_____. Groups 3-12 are called as **6.**_____. The lanthanides and actinides are special series of elements but are also part of the transition block. They are also called as inner transition elements. Groups 1, 2, 13-18 are called as representative elements.

There are three classifications of elements, namely: metals, **7.**_____, and metalloids. The majority of the elements on the left side of the periodic table are **8.**_____. The nonmetals are confined to the right side of the table. **9.**_____ show both properties of metals and nonmetals. The physical properties of metals include luster, and **10.**_____.

**Lesson
2**

Reactive and Nonreactive Metals

There are more than a hundred chemical elements listed on the Periodic Table. Most of these elements are metals which have also been crucial in the development of human civilization. It is therefore important to know something about them.

All metals share many features, and we start by looking at these. But they also vary greatly in how reactive they are to combine with other elements to form compounds.



What's In

Activity 5. Choose-It-Out

Directions: A. From the box below, choose the elements that are metalloids. Write your answers on a separate sheet of paper. Look for applications of these elements in real life.

Argon

Antimony

Boron

Mercury

Calcium

Zinc

Germanium

Silicon

Selenium

Astatine

- B.** Choose the elements that are metals. Write your answers on a separate sheet of paper. Look for applications of these elements in real life.

Carbon Oxygen

Iron Carbon

Magnesium Nickel

Silver Chlorine

Sulfur Lithium

A. Metalloids

B. Metals



What's New

Activity 6. Check this out

Directions: Look at the Periodic Table of Elements below and answer the given questions. Write your answers on a separate sheet of paper.

1 IA 1A	Periodic Table of the Elements																		18 VIIA 7A
1 H Hydrogen 1.008	2 IIA 2A	3 Li Lithium 6.941	4 Be Boron 9.012	5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.011	8 O Oxygen 16.000	9 F Fluorine 19.000	10 Ne Neon 20.183										
11 Na Sodium 22.990	12 Mg Magnesium 24.318	3 IIIIB 3B	4 IVB 4B	5 VB 5B	6 VIIB 6B	7 VIIIB 7B	8 VIII 8	9 VIII 8	10	11 IB 1B	12 IIB 2B	13 Al Aluminum 26.982	14 Si Silicon 28.085	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.457	18 Ar Argon 39.948		
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.958	22 Ti Titanium 47.88	23 V Vanadium 50.920	24 Cr Chromium 51.980	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.409	31 Ga Gallium 69.723	32 Ge Germanium 72.031	33 As Arsenic 74.922	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 83.804		
37 Rb Rubidium 85.461	38 Sr Strontium 87.621	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.941	43 Tc Technetium 95.941	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.40	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.816	50 Sn Tin 118.711	51 Sb Antimony 121.761	52 Te Tellurium 127.601	53 I Iodine 126.904	54 Xe Xenon 131.903		
55 Cs Cesium 132.905	56 Ba Barium 137.728	57-71 Lanthanide Series	72 Hf Hafnium 178.493	73 Ta Tantalum 180.948	74 W Tungsten 183.845	75 Re Rhenium 190.237	76 Os Osmium 190.237	77 Ir Iridium 192.223	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.591	81 Tl Thallium 204.393	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 209.162	85 At Astatine 209.987	86 Rn Radon 222.018		
87 Fr Francium 223.028	88 Ra Radium 226.028	89-103 Actinide Series	104 Rf Rutherfordium 261.011	105 Db Dubnium 262.011	106 Sg Seskagut 263.011	107 Bh Berkelium 264.011	108 Hs Hassium 265.011	109 Mt Meitnerium 268.011	110 Ds Darmstadtium 269.011	111 Rg Roentgenium 272.011	112 Cn Copernicium 274.011	113 Nh Nihonium 280.011	114 Fl Flerovium 281.011	115 Mc Moscovium 283.011	116 Lv Livermorium 293.011	117 Ts Tennessine 294.011	118 Og Oganesson 294.011		

(Source: <https://scienzenotes.org/periodic-table-black-white-wallpaper>)

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Questions:

- In a period, the reactivity of metals decreases from left to right. Arrange the given elements in decreasing order: Fe, K, Ca, and Cu

- In a group, the reactivity of metals increases from top to bottom. Arrange the given elements in increasing order: Na, K, Li, and Rb

- Which element is found in period 6, group 14? _____
- In which period and group is Aluminum (Al) is located? _____
- In which period and group is Platinum (Pt) is located? _____



What Is It

A reaction does not always happen between a metal and a compound. There is an existing definite order of reactivity among metals and hydrogen according to their ability to displace one another. A less reactive metal cannot replace a more reactive metal; hence no reaction will occur. On the other hand, a more reactive metal can replace a less reactive metal and will produce a reaction. To determine the less or more reactive metals refer to the Activity Series of Metals.

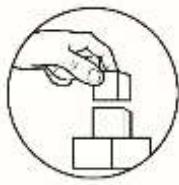
The Activity Series of Metals

<u>Element</u>	<u>Symbol</u>	<u>Group No.</u>	
Potassium	K	1	Most reactive
Sodium	Na	1	
Lithium	Li	1	
Calcium	Ca	2	
Magnesium	Mg	2	
Aluminum	Al	3	
Zinc	Zn	Transition metal	
Iron	Fe	Transition metal	
Tin	Sn	4	Decreasing chemical reactivity
Lead	Pb	4	
[Hydrogen]	H	Non-metal	
Copper	Cu	Transition metal	
Silver	Ag	Transition metal	
Gold	Au	Transition metal	
Platinum	Pt	Transition metal	Least reactive

Activity 7. In or Out

Directions: Write **In** if the statement is True and **Out** if the statement is False. Write your answers on a separate sheet of paper.

1. Potassium, Sodium, and Lithium are metals belonging to Group 1. In this group, its reactivity increases from top to bottom on the Periodic Table.
2. Sodium, Magnesium, and Aluminum belong to Period 2. In a period, its reactivity decreases from left to right.
3. Aluminum is more reactive than Lead.
4. Silver replaces Iron in Iron (II) chloride.
5. The more reactive metal displaces the less reactive metal from its compound.



What's More

Activity 8. Which is which?

Directions: Indicate whether the metal is **Reactive** or **Nonreactive** with Hydrogen in Hydrochloric acid (HCl) or water (H₂O). Please refer to the Activity Series of Metals. Write your answers on a separate sheet of paper.

Example: Li with HCl - Reactive

- | | |
|----------------|-----------------------------|
| 1. Mg with HCl | 6. Na with H ₂ O |
| 2. Ag with HCl | 7. Cu with H ₂ O |
| 3. Cu with HCl | 8. Sn with H ₂ O |
| 4. Au with HCl | 9. Pt with H ₂ O |
| 5. Na with HCl | 10. K with H ₂ O |
| 5. Na with HCl | |

Activity 9. Will the reaction take place?

Directions: Analyze the given reactants below, Can the highlighted metal in the compound be replaced by the metal reactant? Write **YES** if a reaction will take place and **NO** if the reaction will not. Write your answers on a separate sheet of paper.

Reactants		Reactions (YES/NO)
1. Iron (III) oxide	Magnesium	
2. Copper (II) sulfate	Zinc	
3. Potassium	Aluminum nitrate	
4. Gold	Silver chloride	
5. Calcium	Sodium bromide	



What I Have Learned

Directions: Fill in the blanks with the correct answers. Write your answers on a separate sheet of paper.

Metals react differently to other substances. Chemists can list 1._____ according to how quickly they undergo chemical reactions, such as burning or dissolving in acids. The result is called a 2._____ series. Metal at the 3._____ of the series generally reacts more vigorously than those that are 4._____ it in the series. Therefore, a 5._____ reactive metal cannot replace a more reactive metal; hence no 6._____ will occur. However, a more reactive metal can 7._____ a less reactive metal producing a reaction. Using the periodic table of 8._____, one can see a trend in reactivity. In a group, reactivity 9._____ as you go from top to bottom, while in a period, reactivity 10._____ from left to right.



What I Can Do

Activity 10. Which and Why?

Directions: Read the given situation and answer the question that follows. Write your answers on a separate sheet of paper.

Mary has a bestfriend named Joan who is celebrating her 15th birthday. Mary wanted to buy Joan a bracelet as a gift. In the gift shop, the saleslady presented Mary with three types of bracelets made of the following: Brass (an alloy of Copper and Zinc), Steel (an alloy of Iron and Carbon), and pure Silver. If you were Mary, which bracelet will you buy for Joan? Why?

Scoring Rubrics

- 3 – Discussions do not have misconceptions; with complete scientific evidence.
- 2 – Discussions do not completely show scientific evidence.
- 1 – Discussions do not show complete scientific evidence; with misconceptions.
- 0 – There is no discussion shown.



Assessment

Directions: Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Which of the elements does NOT belong to the same period?
 - A. Ag
 - B. Co
 - C. I
 - D. Xe

2. Which of the following belongs to the same family of element Phosphorus?
 - A. Carbon
 - B. Magnesium
 - C. Nitrogen
 - D. Oxygen

3. In what period is Manganese located?
 - A. four
 - B. nine
 - C. seven
 - D. two

4. The following elements belong to the same group EXCEPT?
 - A. Argon
 - B. Calcium
 - C. Helium
 - D. Krypton

5. Which of the following BEST describes metals?
 - A. Metals are dull and brittle.
 - B. Metals are insulators and poor conductors of heat.
 - C. Metals are lustrous, malleable, ductile, and good conductors of heat and electricity.
 - D. Metals are dull, brittle, malleable, ductile, and good conductors of heat and electricity.

6. Which of the following statements are NOT TRUE for metalloids?
 - I. They are all semiconductors.
 - II. They are all good conductors of heat and electricity.
 - III. Some of these elements are Boron, Silicon, and Germanium.
 - IV. They are borderline elements that exhibit both metallic and nonmetallic properties to some extent.

A. I and II B. II and III C. I and III D. II and IV

7. Which metal will most likely replace Copper in Copper(II) chloride?

 - A. Aluminum
 - B. Iron
 - C. Platinum
 - D. Silver

8. Which metal is found at the bottom of the activity series of metals?

 - A. Copper
 - B. Gold
 - C. Iron
 - D. Platinum

9. Which metal is widely used as jewelry?

 - A. Aluminum
 - B. Gold
 - C. Potassium
 - D. Zinc

10. Which one of the following transition metals reacts the least with water?

 - A. Copper
 - B. Gold
 - C. Platinum
 - D. Silver

11. Which one of the following metals reacts most violently with cold water?

 - A. Aluminum
 - B. Copper
 - C. Lithium
 - D. Zinc

12. Which of the following is arranged according to increasing reactivity?

 - A. Fe, Cu, K, Ca
 - B. Cu, Fe, Ca, K
 - C. Cu, Ca, Fe, K
 - D. Ca, Fe, Cu, K

13. In which arrangement of elements will reactivity generally become greater?

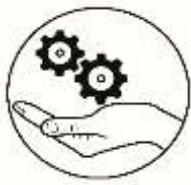
 - A. left to right
 - B. bottom to top
 - C. top to bottom
 - D. both A and C

14. Which sets of metals follows the trend of reactivity in a group?

 - A. K, Li, Na, Rb
 - B. Li, K, Na, Rb
 - C. Li, Na, K, Rb
 - D. Na, Li, K, Rb

15. Sodium, Magnesium, and Aluminum belong to period 2. Which of the following statements is correctly stated?

 - A. Aluminum repels Magnesium from its compound.
 - B. Sodium bonds with Aluminum from its compound.
 - C. Aluminum displaces Sodium from its compound.
 - D. Sodium pushes out Aluminum from its compound.



Additional Activities

Activity 11. Thinking out of the box

Directions: Think about the changes that you have observed around you, particularly those involving metals. Write your answers on a separate sheet of paper.

1. What harmful effects could happen when a metal mixes with acids?

2. What are some ways of preventing metals from corrosion?



Answer Key

Lesson 1

What's New		Activity 2.		Activity 1.		What I Know		ACROSS		DOWN		What I Know	
1. ELEMENTS	2. FAMILY	3. METALS	4. PERIOD	5. GROUP	6. METALLOID	7. DUCTILE	8. HALOGEN	9. LUSTER	10. NONMETALS	11. A	12. C	13. B	14. C

Identify if Metal or Nonmetal (M) or Nonmetalloid (NM) or Metalloid (Met)	Name	Symbol	Period	Group Number	Metal	Element	Activity 3.	What's More	Activity 4
metalloids	Gold	Au	11	6	M				
metals	Francium	Fr	1	7	M				
metalloids	Calcium	Ca	2	4	M				
metals	Neon	Ne	18	2	NM				
metalloids	Helium	He	18	1	NM				
metals	Tin	Sn	14	5	M				
chalcogens	Aluminum	Al	13	3	M				
metalloids	Boron	B	13	2	Met				
metalloids	Neon								

metals	Transition metals	Chalcogens	Metalloids	Metals	Nonmetals	Transition metals	Conductivity	Activity 2.
metalloids	metalloids	metalloids	metalloids	metalloids	metalloids	metalloids	metalloids	Activity 1.
metals	metals	metals	metals	metals	metals	metals	metals	Activity 1.
metalloids	metalloids	metalloids	metalloids	metalloids	metalloids	metalloids	metalloids	Activity 1.
metals	metals	metals	metals	metals	metals	metals	metals	Activity 1.

Lesson 2

<p>What I Have Learned</p> <p>1. metals 2. reactivity 3. top 4. below 5. less 6. reaction 7. replace 8. elements 9. increases 10. decreases</p> <p>I will choose Silver because according to the Activity series of metals, it is the least reactive of the three given metals.</p> <p>Activity 10.</p> <p>Assessment</p>	<p>What I Can Do</p> <p>I will choose Silver because according to the Activity series of metals, it is the least reactive of the three given metals.</p> <p>Activity 11.</p> <p>Additional Activities</p> <p>1. It will corrode metals. It will make it weak. 2. By adding a less reactive metal(alloy). Soaking it in oils/grease. Cover it in paint.</p>	<p>What's More</p> <p>Act 8.</p> <p>1. Reactive 2. Non-reactive 3. Non-reactive 4. Non-reactive 5. Reactive</p> <p>Activity 9.</p> <p>1. Yes 2. Yes 3. Yes 4. No 5. No</p>
<p>What's In</p> <p>Activity 5.</p> <p>A. Boron Boron Germanium Antimony Silicon Astatine Iron Magnesium Silver Nickel Lithium</p>	<p>What is It</p> <p>Activity 7.</p> <p>1. In 2. In 3. In 4. Out 5. In</p>	<p>Activity 9.</p> <p>1. Yes 2. Yes 3. Yes 4. No 5. No</p>

References

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For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpq@deped.gov.ph