



INDIAN SCHOOL AL WADI AL KABIR



Class: VIII	DEPARTMENT: SCIENCE	Date: 13.10.2023
Worksheet No.: 9 With answers	TOPIC: Materials: Metals and Non-metals	Note: A4 FILE FORMAT
NAME OF THE STUDENT:	CLASS & SEC:	ROLL NO.

I. I. OBJECTIVE-TYPE QUESTIONS:

- Rishi bought an idol statue made of copper from a fair, but he was astonished to see that the idol was covered with a light green coating on its surface after some days, the light green coating on the statue is a mixture of:
 - Copper hydroxide and copper carbonate
 - Copper sulphate and copper hydroxide
 - Copper sulphate and copper carbonate
 - None of the above
- Radhika accidentally left a non-metal in the open air, and the non-metals started burning. Name the non-metal.
 - Mercury
 - Copper
 - Phosphorus
 - None of these
- In temples, bells are made up of metals instead of wood, metals produce sound waves which is why they are known as:
 - conductors
 - ductile
 - Insulators
 - Sonorous
- Karan immersed an iron nail into a Copper sulphate solution. The blue colour of the Copper sulphate solution changes to :
 - Blue to pink
 - Blue to green
 - Blue to black
 - Blue to red
- Magnesium oxide is obtained by burning Magnesium ribbon in air. What is the nature of magnesium oxide?
 - Acidic
 - Basic
 - Neutral

- d) None of the above
6. Reena had learned that metals are hard but her teacher had cut one of the metals with a knife. Name the metal used by the teacher:
- a) Potassium
 - b) Copper
 - c) Aluminum
 - d) Iron
7. Manpreet dipped red litmus paper into rust solution, the colour of the red litmus turned blue. What would be the possible cause of this change?
- a) Rust solution is acidic in nature
 - b) Rust solution is basic in nature
 - c) Rust solution is neutral
 - d) None of these
8. Gagan was taught by his teacher that hydrogen gas is produced when metals react with acid but when he placed a metal in dilute hydrochloric acid no reaction occurred. Which metal did he place in dilute hydrochloric acid?
- a) Magnesium
 - b) Iron
 - c) Copper
 - d) Aluminum

For the following questions, two statements are given- one labelled Assertion (A) and the other labelled Reason (R).

Select the correct answer to these questions from the codes (i), (ii), (iii), and (iv) as given below :

- i) Both A and R are true and R is the correct explanation of the assertion.**
- ii) Both A and R are true but R is not the correct explanation of the assertion.**
- iii) A is true but R is false.**
- iv) A is false but R is true**

9. Assertion (A): Metals are sonorous.
Reason (R): They are generally brittle in the solid state, they break into pieces when hammered.
(iii) A is true but R is false.
10. Assertion (A): A statue made up of copper acquired a dull green coating on it after a couple of months.
Reason (R): Copper does not react with dilute hydrochloric acid even on heating.
(ii) Both A and R are true but R is not the correct explanation of the assertion.
11. Assertion (A): Non-metal chlorine is used in the water purification process.
Reason(R): Chlorine has the power to kill germs.

(i) Both A and R are true and R is the correct explanation of the assertion.

II. **VERY SHORT ANSWER (2M):**

12. Define-

- a) Malleability (**Hint: a property by which metals can be beaten into thin sheets.**)
- b) Ductility (**Hint: a property by which metals can be drawn into wires.**)

13. Name the following-

- a) Property of metals which makes them useful as electric wires-**(Hint: Ductility and electrical conductivity)**
- b) Non-metal which has metallic lustre-**(Hint: Iodine)**
- c) A non-metal which conducts electricity or heat- **(Hint: Graphite)**
- d) Metals which are soft and can be cut with a knife-**(Hint: Sodium and Potassium)**
- e) A metal which is found in the liquid state at room temperature-**(Hint: Mercury)**
- f) A non-metal which is the hardest substance known. **(Hint: Diamond, a form of carbon)**

14. Metal oxides are basic in nature. Explain with an example.

(Hint: Metals react with oxygen to form metal oxide. Metal oxides dissolved in water form respective metal hydroxides which can turn red litmus blue Eg Magnesium combines with oxygen to form Magnesium oxide, Magnesium oxide dissolves in water to form Magnesium hydroxide when we dip a red litmus it turns blue confirming that metal oxides are basic in nature.

15. Raj uses a simple electric circuit to test the flow of electric current through different materials. What will he observe with the following materials? Give a reason for it.

- a) Iron nail – **(Hint: Iron being a metal allows the electric current to pass through it)**
- b) Coal- **(Hint: Is a form of carbon which is a non-metal that does not allow electric current to pass through it)**

16. Why is sodium metal stored in kerosene? **(Hint: Sodium is a highly reactive metal and reacts vigorously with oxygen and water present in the air such that it may even catch fire. Sodium does not react with kerosene, this is the reason for preserving sodium in kerosene.)**

17. State two physical properties on the basis of which metals may be distinguished from non-metals. **(Hint: a. Metals are malleable and ductile. They can be hammered into thin sheets and drawn into thin wires. E.g. Gold and Silver Non-metals are brittle they are neither malleable nor ductile. They break into small pieces when hammered. E.g. Sulphur & Phosphorus are brittle**

b. Metals are good conductors of heat and electricity. E.g. Silver, Copper, and Aluminium

Non-metals are bad conductors of heat and electricity except graphite. E.g. Sulphur & Phosphorus)

III. SHORT ANSWER TYPE QUESTIONS: (3M)

18. Write about the uses of metals and non-metals. **(Hint: Aluminium is used for making electrical cables, packaging, cooking utensils, etc. Sulphur is used in the manufacture of compounds like sulphuric acid, and sulphate and in the production of matches, dyes, and gunpowder.)**
19. Differentiate between metals and non-metals on the basis of their chemical properties.
(Hint: Metals Non-Metals
- 1. Metals react with oxygen to form basic oxides. Nonmetals react with oxygen to form acidic or neutral oxides.**
 - 2. Metals react with dilute acids to form a salt and evolve hydrogen gas. Nonmetals do not react with dilute acids.)**
20. Give reasons for the following:
- Copper is used in electrical wiring. **(Hint: Copper is used for electrical wiring because it is a good conductor of electricity and it is ductile).**
 - Aluminium is used to make foils.
Hint: Aluminium foils are used to wrap food items because aluminium, a soft malleable metal, can be beaten to in sheets to form thin wrapping sheets. Moreover, it does not react with food items.
 - Pickles and curd are not stored in aluminium cans.
Hint: Pickles and curd are not stored in aluminium cans as curd and pickles contain acid and we know that acid and metal react with each other to form metal oxide and hydrogen gas, making the food harmful.
 - Immersion rods for heating liquids are made of metallic substances.
Hint: Immersion rods are made up of metallic substances because metals are good conductors of heat and electricity. They get hot very soon on passage of current and warm the water.
 - Zinc can displace Copper from Copper sulphate solution.
Hint: Zinc can displace copper from Copper sulphate solution because Zinc is more reactive than Copper as per the reactivity series.
21. A boy burnt sulphur powder and collected the gas in a gas jar. Then he poured water into the jar and a milky solution was formed as the gas was dissolved in water.
- Name the gas which is formed in the reaction. **(Hint: Sulphur dioxide)**

- b) What is the product formed when water is mixed with the gas? (**Hint: Sulphurous acid**)
- c) Will the solution turn red litmus blue? Why? (**Hint: No because Non-metallic oxides are acidic in nature it turn blue litmus red and no change with red litmus**)
22. What happens when zinc granules are put in copper sulphate solution and left undisturbed for some time, explain the observations and write the word equation involved. What type of reaction is this? (**Hint: Zinc being more reactive than copper displace copper from copper sulphate and form zinc sulphate and copper. We find that the blue colour of the solution disappears and a powdery red mass is deposited at the bottom of the beaker. Displacement Reaction**)
23. Complete the following reactions: -
- a) Silver + copper sulphate → **No reaction**
- b) Iron + oxygen + water → **Hydrated iron oxide (rust)**
- c) Sulphur dioxide + water → **Sulphurous acid**
- d) Aluminium + hydrochloric acid → **Aluminium chloride + Hydrogen**
- e) Iron + sulphuric acid → **Iron sulphate + Hydrogen**

IV. LONG ANSWER TYPE QUESTIONS (5 M):

24. Arjun took a few samples of metals and non-metals in separate test tubes A, B, C, D, E and F. He added 5 ml of dilute hydrochloric acid to all the test tubes. If no reaction takes place in the cold solution, warm the test tube gently. He repeated the same activity with dilute sulphuric acid. Complete the following table-

Test Tube Label	Metal/ Non-metal	Reaction with Dilute Hydrochloric Acid		Reaction with Dilute Sulphuric Acid	
		Room Temperature	Warm	Room Temperature	Warm
A.	Magnesium (ribbon)	Reacts to give hydrogen	Rapid reaction	Reacts to give hydrogen	Rapid reaction
B.	Aluminium (foil)	Reacts to give hydrogen	Rapid reaction	Reacts to give hydrogen	Rapid
C.	Iron (filings)	Reacts to give hydrogen	Rapid reaction	Reacts to give hydrogen	Rapid
D.	Copper (Peeled flexible wire)	No reaction	No reaction	No reaction	No reaction
E.	Charcoal (powder)	No reaction	No reaction	No reaction	No reaction
F.	Sulphur (powder)	No reaction	No reaction	No reaction	No reaction

25. Saloni took a piece of burning charcoal and collected the gas evolved in a test tube.

How will she find the nature of the gas? Write down word equations of all the reactions in this process.

[Hint- (a) When charcoal is burnt in the air, carbon dioxide is formed. Add some water to the test tube in which the gas is collected. Now, cover the test tube. Shake it well. Test the solution with blue litmus and red litmus. Blue litmus turns red. Thus, the nature of gas is acidic.

(b) Carbon + Oxygen \longrightarrow Carbon dioxide,
 Carbon dioxide + water \longrightarrow carbonic acid
 (Charcoal is a form of carbon)

26. a) What happens when a copper vessel is exposed to moist air?

Hint: When a copper vessel is exposed to moist air for long, it acquires a dull green coating. ▼

The green material is a mixture of Copper hydroxide ($\text{Cu}(\text{OH})_2$) and Copper carbonate (CuCO_3).

The following is the reaction

Copper + oxygen + water + carbon dioxide \longrightarrow Copper hydroxide + Copper carbonate

b) What are oxides? Write the nature of metallic and non-metallic oxides.

Hint: oxide is a chemical compound that contains at least one oxygen atom and one other element in its chemical formula. metallic oxide is basic in nature while non-metallic oxides are acidic in nature

27. Give any four points of difference between the physical properties of metals and non-metals.

Physical properties	Metals	Non-metals
Malleability	Malleable	Non-malleable
Ductility	Ductile	Non-ductile
Sonority	Sonorous	Non-sonorous
Conduction of electricity	Good conductor	Poor conductors(except graphite)

V. PASSAGE BASED QUESTIONS:

Read the passage carefully and answer the following questions.

Metals are lustrous whereas non-metals have a dull appearance. Metals like sodium and potassium are soft and can be cut with a knife. Generally, metals are malleable and ductile. Non-metals do not have these properties. Generally, metals are good conductors of heat and electricity but non-metals are poor conductors. On burning, metals react with oxygen to produce metal oxides which are basic in nature. Non-metals react with oxygen to produce non-metallic oxides which are acidic in nature. Some metals react with water to produce metal hydroxides

and hydrogen gas. Generally, non-metals do not react with water. Metals react with acids and produce metal salts and hydrogen gas. Generally, non-metals do not react with acids. Some metals react with bases to produce hydrogen gas. More reactive metals displace less reactive metals from their compounds in aqueous solutions. Metals and non-metals are used widely in everyday life.

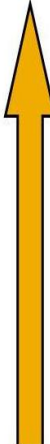
1. Which gas is released when metals react with bases? (**Hint: When a base reacts with a metal, it involves the formation of salt along with the liberation of hydrogen gas.**)
2. Explain the reactions of metals and non-metals with acids. (**Hint: Metals react with acids to form respective salts along with the evolution of hydrogen gas that burns with a pop sound. There are some metals like copper, silver, gold and platinum that do not liberate hydrogen with acids. Generally, non-metals do not react with acids.**)
3. Cooking utensils are made of metals but their handles are made of wood or plastic, Why? (**Hint: The metal forms the surface of the utensils since it can effectively conduct the heat to the required substances. On the other hand, the handles are made of plastic or wood since these substances are insulators, thus enabling safe usage of the utensil**)

VI. CASE STUDY-BASED QUESTIONS:

1. Kanika takes a burning substance which is yellow powder and collects the evolved vapours in a test tube, making sure, that they do not escape. A small amount of water is added to the test tube. A few drops of blue litmus solution are added to the solution obtained. The litmus solution turns red.
 - i) What could be the burning substance? (**Hint: Sulphur**)
 - ii) Why blue litmus solution turn red in the above activity? [**Hint: Non-metallic oxides are acidic in nature and hence they turn blue litmus red.**]
 - iii) Explain what happens when sulphur burns in the air. [**Hint: When sulphur burns in air it combines with oxygen and form sulphur dioxide gas. When sulphur dioxide gas is dissolved in water it forms sulphurous acid which turns blue litmus red.**]
2. A group of science club students collected the aluminium foil from each class during the break. The students were surprised to see the amount of aluminium foil used and dumped the garbage when presented in the assembly. Thereafter many students minimized the use of foil and the rest all ensured to put it in the bin meant for collecting aluminium foil for recycling, installed by the eco-club members.
 - a) Why is aluminium metal used to make foils used for wrapping food?
Hint: (a) Aluminium metal is a very malleable metal and can be beaten into thin sheets. It also forms a protective layer of aluminium oxide which does not allow the foil to react with food.
 - b) Which property of aluminium makes it useful for making electrical wires?
Hint: (b) Aluminium is a good conductor of electricity and is a very ductile metal, it can be drawn into thin wires.
 - c) What value of eco-club members is seen in this the act?) **Science eco-club members showed the value of group work, collaborative approach and aware responsible**

REACTIVITY SERIES-

- The arrangement of metals in a vertical column in the order of decreasing reactivity is called the **reactivity series** of metals.
- Metals like sodium and potassium react vigorously with dilute acids.
- The metals higher than hydrogen react with dilute acids.
- A more reactive metal displaces a less reactive metal from its salt solution.
- Metals like silver, gold, copper and platinum do not react with dilute acids.

<u>P</u> otassium	P lease	 <p>Most reactive</p> <p>Reactivity increases</p> <p>Least reactive</p>
<u>S</u> odium	S top	
<u>C</u> alcium	C alling	
<u>M</u> agnesium	M e	
<u>A</u> luminium	A	
<u>Z</u> inc	Z ebra	
<u>I</u> ron	I	
<u>T</u> in	T hink	
<u>L</u> ead	L arry	
(<u>H</u> ydrogen)	H oo	
<u>C</u> opper	C an	
<u>S</u> ilver	S ee	
<u>G</u> old	G old	

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