

## Practice Questions - Term I

Date: 16/11/2021

Subject: Chemistry

Topic : Metals and Non-Metals

Class: X

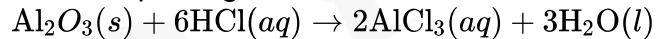
1. Which of the following metals form amphoteric oxide?

- ☒ A. Copper
- ☒ B. Silver
- ☒ C. Aluminium
- ☒ D. Iron

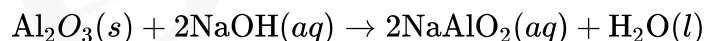
Aluminium forms amphoteric oxides since it reacts with both acids and bases.

Aluminium on reaction with oxygen form alumina which shows both acidic as well as basic behaviours and react with both acids and bases to produce salts and water. Such metal oxides are known as amphoteric oxides.

An example is given below:



[Acidic nature]



[Basic nature]

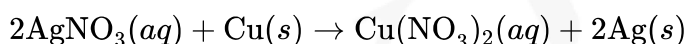
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2. Beakers A, B, and C contain zinc sulphate, silver nitrate, and ferrous sulphate solutions respectively. Copper pieces are added to each beaker. Blue colour solution will appear in case of beaker:

- ☐ A. C
- ☒ B. B
- ☐ C. B & C
- ☐ D. A & C

A more reactive metal can replace a lesser reactive metal from its salt solution. However, the vice versa isn't quite possible.

Copper being a less reactive metal than zinc and iron cannot replace them from their respective salt solution. On the other hand, copper is more reactive than silver and hence, displaces silver from its salt solution.



Hence, blue colour solution (Copper nitrate) will be formed in the beaker B.

3. The atomic number of two elements A and B are 12 and 8 respectively. What type of a compound is formed when they combine?

- ☒ A. Ionic compound
- ☐ B. Covalent compound
- ☐ C. Coordinate compound
- ☐ D. No compound is formed

The compound formed is AB which is ionic in nature. As we know, an ionic compound is a chemical compound in which ions are held together by electrostatic force.

The electronic configuration of two elements A and B are 2, 8, 2 and 2, 6 respectively.

From their electronic configuration, we see that A (magnesium) is a metal and B (oxygen) is a non-metal, thereby A loses its valence electrons and forms a cation while B accepts those electrons and forms an anion. These oppositely charged ions are drawn closer due to electrostatic forces and an ionic compound (MgO) is formed.

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4. Which of the given metals exhibits both reactions (a) as well as (b)?

(a)  $\text{Metal} + \text{Oxygen} \rightarrow \text{Metal oxide}$

(b)  $\text{Metal} + \text{Cold water or hot water or steam} \rightarrow \text{Metal hydroxide} + \text{Hydrogen}$

- ☐ A. Magnesium (Mg), iron (Fe), sodium (Na), and copper (Cu)
- ☐ B. Magnesium (Mg), zinc (Zn), platinum (Pt), and gold (Au)
- ☒ C. Sodium (Na), potassium (K), magnesium (Mg) and calcium (Ca)
- ☐ D. Copper (Cu), magnesium (Mg), gold (Au), and sodium (Na)

Sodium (Na), potassium (K), calcium (Ca), and magnesium (Mg) react with oxygen to form their respective metal oxides. Sodium, potassium and calcium being very reactive, react with cold water, hot water and steam. However, magnesium is less reactive than these three and reacts with only hot water and steam.

Iron (Fe) reacts with both oxygen and steam. Copper (Cu) reacts with oxygen but is unreactive with any form of water.

Platinum (Pt) and gold (Au) are unreactive towards both water and oxygen.

Hence, the elements showing both reactions are sodium (Na), potassium (K), magnesium (Mg) and calcium (Ca).

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5. Three metals X, Y and Z are given. X reacts with cold water, hot water and steam. Y reacts with hot water and steam and Z reacts with steam only. Identify X, Y, and Z from the below options.

X:- Sodium



A. Y:- Zinc

Z:- Magnesium

X:- Copper



B. Y:- Magnesium

Z:- Zinc

X:- Magnesium



C. Y:- Zinc

Z:- Potassium

X:- Sodium



D. Y:- Magnesium

Z:- Zinc

Order of reactivity of metals will be **Sodium (Na) > Magnesium (Mg) > Zinc (Zn)**

- Sodium is a very reactive metal. Therefore, it reacts readily with cold water, hot water and steam.
- Magnesium, being less reactive, does not react with cold water and it reacts slowly with hot water and vigorously with steam.
- Zinc, being very less reactive, does not react with cold water or hot water but it reacts with steam.

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6. Observe the table and identify metals and non-metals. Select the correct option.

| Sl.No | Set-1          | Set-2         |
|-------|----------------|---------------|
| 1.    | Sodium (Na)    | Oxygen (O)    |
| 2.    | Magnesium (Mg) | Chlorine (Cl) |
| 3.    | Iron (Fe)      | Nitrogen (N)  |
| 4.    | Gold (Au)      | Sulphur (S)   |
| 5.    | Calcium (Ca)   | Carbon (C)    |

- ☒ **A.** Set 1: Metals and set 2: Non-metals  
☐ **B.** Set 1: Non-metals and set 2: Metals  
☐ **C.** Both sets 1 & 2 are metals  
☐ **D.** Both sets 1 & 2 are non-metals

Metals are solids, and are good conductors of heat and electricity. They are malleable, ductile and sonorous in nature.

Most of the non-metals except bromine (liquid) are solids and gases.

From the table, set-1 elements (sodium, magnesium, iron, gold, and calcium) are metals, and set-2 elements (oxygen, chlorine, nitrogen, sulphur, and carbon) are non-metals.

7. Select the correct option in which metals are arranged correctly according to their reactivity.

- ☐ **A.**  $\text{Fe} > \text{Cu} > \text{Al} > \text{Ca}$   
☒ **B.**  $\text{Zn} > \text{Fe} > \text{Pb} > \text{Cu}$   
☐ **C.**  $\text{Cu} > \text{Al} > \text{Mg} > \text{Ca}$   
☐ **D.**  $\text{Pb} > \text{Cu} > \text{Fe} > \text{Ca}$

A series in which metals are arranged in the decreasing order of their reactivity is called reactivity series.

The arrangement of metals as per reactivity series is:  $\text{K} > \text{Na} > \text{Ca} > \text{Mg} > \text{Al} > \text{Zn} > \text{Fe} > \text{Pb} > \text{H} > \text{Cu} > \text{Ag} > \text{Au}$ .

Therefore, the correct order is  $\text{Zn} > \text{Fe} > \text{Pb} > \text{Cu}$ .

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8. P, Q, R, S and T are metals in the decreasing order of their reactivity in the activity series. Which one of them is most likely to occur in a free state in nature?

☐ A. P

☐ B. Q

☐ C. S

☒ D. T

The reactivity series for the given metals (P, Q, R, S and T) is:  
 $P > Q > R > S > T$

T is least reactive metal in the given reactivity series which means it has least tendency to react with another element to form a compound. Therefore, T is most likely to occur in free state in nature.

9. Which of the following oxides is basic in nature?

☐ A.  $\text{SO}_2$

☐ B.  $\text{CO}_2$

☒ C.  $\text{K}_2\text{O}$

☐ D.  $\text{Cl}_2\text{O}$

Generally, metal oxides are basic in nature while non-metal oxides are acidic.

Hence,  $\text{K}_2\text{O}$  being a metal oxide, will change the red litmus paper to blue into its aqueous solution similar to the characteristics of a basic substance. Therefore, option 'c' i.e.  $\text{K}_2\text{O}$  is the correct option.

$\text{SO}_2$ ,  $\text{CO}_2$  and  $\text{Cl}_2\text{O}$  being non-metal oxides will exhibit acidic behaviour.

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10. Which of the following properties is not shown by ionic compounds?

- ☒ A. High electrical conductivity in solid state
- ☐ B. Solubility in water
- ☐ C. High melting and boiling points
- ☐ D. Crystalline solids at room temperature

Ionic compounds do not conduct electricity in solid state; instead they conduct electricity in molten state or in the form of its aqueous solution.

11. Assertion (A): The handles of cooking pans are not made up of metals.  
Reason (R): Metals are good thermal conductors.

- ☒ A. Both A and R are true and R is the correct explanation of A
- ☐ B. Both A and R are true but R is not the correct explanation of A
- ☐ C. A is true but R is false
- ☐ D. A is false but R is true

Generally, metals are good thermal and electrical conductors. Being good conductors, they heat up quickly and are difficult to hold. So, they are not used as handles of cooking or electrical appliances.

Hence, both A and R are true and R is the correct explanation of A.

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12. Which of the following is correct?

- ☒ A. Acids are always kept in metallic vessels.
- ☒ B. Some metals catch fire easily when they come in contact with air.
- ☒ C. All metals are solid at room temperature.
- ☒ D. Copper reacts with  $\text{dil.H}_2\text{SO}_4$  and evolves  $\text{H}_2$  gas.

Acids react with most of the metals therefore they must not be kept in metallic vessels.

Metals such as sodium and potassium burn easily when they come in contact with air. Hence, (b) is correct.

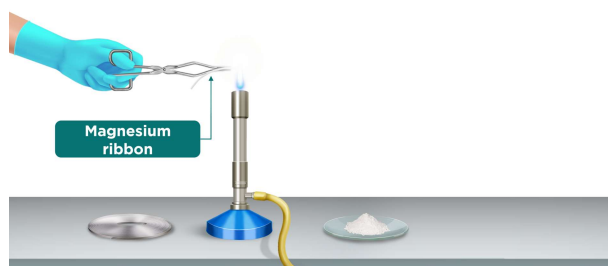
Mercury, a metal, is found to be in the form of liquid at room temperature.

Copper does not react with dilute sulphuric acid therefore no evolution of hydrogen gas will occur.



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13. A student performs an experiment of burning magnesium ribbon in the air. A chemical reaction takes place and as a result, a white powder X forms along with a bright white light.



The aqueous solution of X changes \_\_\_\_\_.

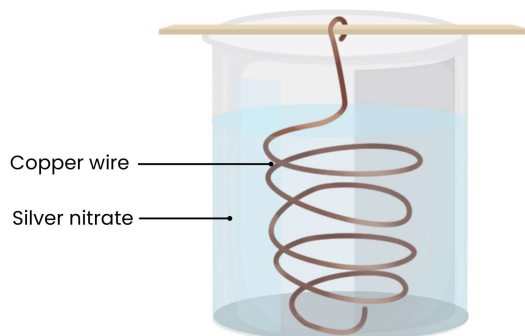
- ☒ A. red litmus to blue
- ☐ B. blue litmus to red
- ☐ C. red litmus to colourless
- ☐ D. blue litmus to colourless

Magnesium reacts with oxygen present in air and burns to produce powder of magnesium oxide(X) which is white in colour along with a bright flame.

Oxides of metals like magnesium are basic in nature. Aqueous solution of these oxides turn red litmus to blue.

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14. A student performs an experiment in which he dipped a copper coil to the silver nitrate solution.



Which of the following is the correct observation related to this experiment?

- ☐ A. Colour of the solution changes to green.
- ☒ B. Gray coloured layer of silver appears on the surface of copper coil.
- ☐ C. The copper coil remains unaffected by the reaction.
- ☐ D. The colour of the solution remains the same.

The arrangement of metals as per reactivity series is:  $K > Na > Ca > Mg > Al > Zn > Fe > Pb > H > Cu > Ag > Au$ .

Copper (Cu) being more reactive than silver (Ag), displaces it from its aqueous solution of silver nitrate.

After getting displaced from its solution, silver gets deposited on the surface of copper coil, leaving a grey layer. In addition, due to the formation of copper nitrate, the colour of the solution changes to blue.



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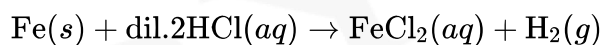
15. Metal M is a major constituent of steel. On reaction with dilute hydrochloric acid, M releases a gas G which burns with a pop sound along with the formation of a greenish coloured solution C.

(i) Identify 'M' and 'G' from the following:

- ☒ A. M: Iron, G: Hydrogen gas
- ☐ B. M: Iron, G: Carbon dioxide gas
- ☐ C. M: Magnesium, G: Hydrogen gas
- ☐ D. M: Magnesium, G: Carbon dioxide gas

Steel, an alloy, has iron as its major constituent. Therefore metal 'M' will be iron (Fe).

Iron reacts with dilute hydrochloric acid and results in the evolution of hydrogen gas which burns with a pop sound. Hence, gas 'G' will be hydrogen gas ( $H_2$ ).



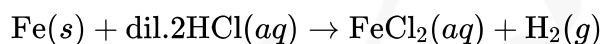
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16. Metal M is a major constituent of steel. On reaction with dilute hydrochloric acid, M releases a gas G which burns with a pop sound along with the formation of a greenish coloured solution C.

(ii) Which of the following is the correct formula of solution 'C'?

- ☐ A. FeCl
- ☐ B. MgCl<sub>2</sub>
- ☒ C. FeCl<sub>2</sub>
- ☐ D. MgCl

Generally, when a metal reacts with dilute acid, it produces salt and hydrogen gas. Here, iron reacts with dilute hydrochloric acid and results in the formation of a greenish solution of iron chloride along with the evolution of hydrogen gas.



Therefore, the greenish solution is iron chloride (FeCl<sub>2</sub>).

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17. Metal M is a major constituent of steel. On reaction with dilute hydrochloric acid, M releases a gas G which burns with a pop sound along with the formation of a greenish coloured solution C.

(iii) Which of the following metals will displace metal 'M' from its solution 'C'?

- ☒ A. Aluminium
- ☐ B. Gold
- ☐ C. Lead
- ☐ D. Silver

The arrangement of metals as per reactivity series is:  $K > Na > Ca > Mg > Al > Zn > Fe > Pb > H > Cu > Ag > Au$ .

Lead, gold and silver are less reactive than metal M i.e. iron therefore they will not displace it from its compound C.

While aluminium being more reactive than iron will displace it from its compound C i.e. iron chloride and will result in the formation of aluminium chloride.

Therefore, option 'a' i.e. aluminium is the correct.

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18. Metal M is a major constituent of steel. On reaction with dilute hydrochloric acid, M releases a gas G which burns with a pop sound along with the formation of a greenish coloured solution C.

(iv) M can displace the metal from which of the following compounds in their aqueous solutions?

- ☐ A. Zinc nitrate
- ☐ B. Magnesium sulphate
- ☐ C. Calcium chloride
- ☒ D. Silver nitrate

The arrangement of metals as per reactivity series is:  $K > Na > Ca > Mg > Al > Zn > Fe > Pb > H > Cu > Ag > Au$ .

M i.e. iron being less reactive than zinc, magnesium, and calcium will not be able to displace these metals from their aqueous solution. While it can displace silver from its aqueous solution because iron is more reactive than silver.

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19. Given below is a table containing a few metals and non-metals with exceptional properties. Fill the dark spaces by identifying X, Y and Z in the table.

| Sl. | Element       | Category  | Exceptional property         |
|-----|---------------|-----------|------------------------------|
| 1.  | Graphite (C)  | Non-metal | Conducts Electricity         |
| 2.  | Diamond (C)   | Non-metal | Hardest natural substance    |
| 3.  | Iodine (I)    | Non-metal | Z                            |
| 4.  | Potassium (K) | Y         | Soft (can be cut with knife) |
| 5.  | X             | Metal     | Low M.P. (melts in hand)     |

- ☒ A. X - Gallium (Ga); Y - Metal; Z - Lustrous
- ☐ B. X - Gallium (Ga); Y - Metal; Z - Sonorous
- ☐ C. X - Carbon (C); Y - Non-metal; Z - Lustrous
- ☐ D. X - Silver (Ag); Y - Metal; Z - Ductile

**X- Gallium (Ga):** Of all the metals, gallium (29.76 °C) and caesium (28.44 °C) have very low melting points that they can melt even at room temperature.

**Y- Metal:** Alkali metals (sodium, potassium, lithium) are so soft that they can be cut with a knife.

**Z- Lustrous:** Iodine is a non-metal but is lustrous in nature.

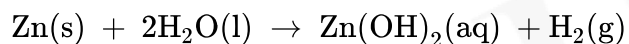
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20. Statement I:- Hydrogen gas is not evolved when zinc reacts with cold water.

Statement II:- Sodium reacts vigorously with cold water to produce sodium hydroxide and hydrogen gas.

- ☒ A. Only statement I is true.
- ☒ B. Only statement II is true.
- ☒ C. Both statements are true.
- ☒ D. Both statements are false.

Zinc does not react with cold water to produce hydrogen gas. It produces hydrogen gas on reacting with steam. The reaction involved is:



Sodium reacts vigorously with cold water to produce sodium hydroxide and hydrogen gas. The reaction involved is:

