

## 13. Metals and Non-metals

### Exercises

#### 1 A. Question

Answer the following question.

Why is it possible to draw silver into a wire when even a long pencil-point breaks so easily?

#### Answer

Silver is a metal having a property of ductility. Due to the property of ductility it is possible to draw silver in to wire whereas pencil is made up of graphite which is non-metal. It does not have the property of ductility as it is smooth and brittle. Due to smoothness long pencil-point breaks so easily.



#### 1 B. Question

Answer the following question.

Why is copper used for electrical wiring in our houses?

#### Answer

- (i) Copper is used for electrical wiring in houses because copper is good conductor of electricity.
- (ii) It has high melting and boiling point.
- (iii) It carries more electric current as compared to other metal wire.
- (iv) Copper wire doesn't get affected from climate condition so that it has long life time.

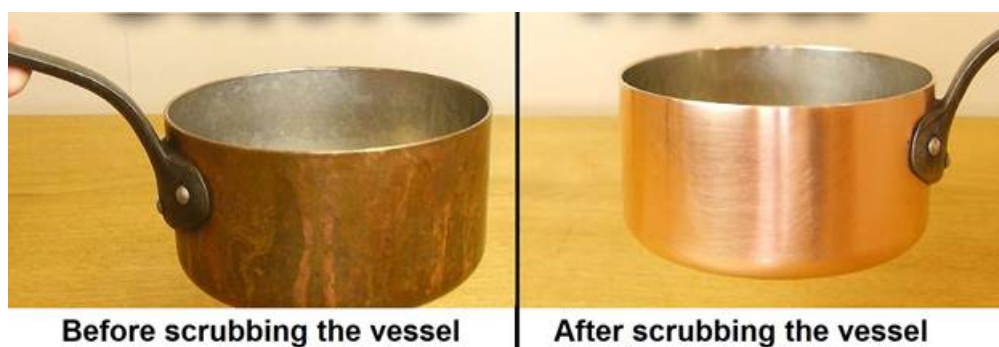
#### 1 C. Question

Answer the following question.

Why does a copper vessel shine again after scrubbing?

#### Answer

After a longer period of time, the copper vessels become tarnished when in contact with air. This layer is formed due to oxidation of copper in air. It is a greenish or blackish copper oxide coating which is basic in nature. To remove this coating, the vessel is rubbed or scrubbed with an acidic material ex lemon, tartaric acid. The reaction of basic oxide layer with the acid results in the formation of a salt, which can be easily washed away with water. And, the copper metal vessel shines again.



### 1 D. Question

Answer the following question.

Give two characteristics of alloys.

#### Answer

Alloy is a homogeneous substance which is made after melting of two or more elements. Basically, it is a mixture of any two or more than two metals.

#### Characteristics of alloys:

1. Different alloys have different properties like malleability, physical appearance etc. Example, copper and tin combine to form Bronze. Bronze is a harder alloy than copper. If the physical properties of alloy can be changed but chemical properties will remain the same.

2. Alloy having compositions of elements in fixed proportions

For example: Brass is alloy of copper and tin.

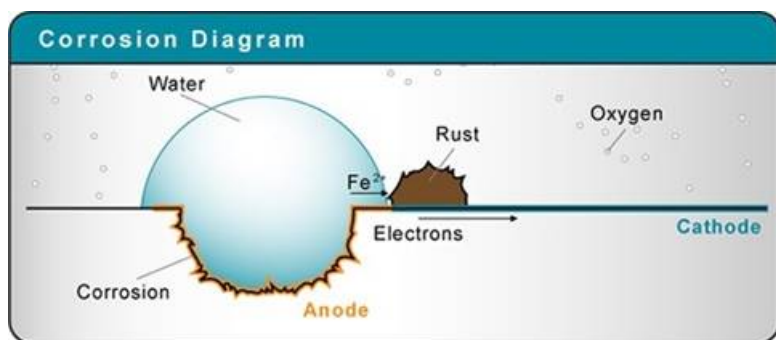
### 1 E. Question

Answer the following question.

What is meant by corrosion?

#### Answer

Corrosion is deterioration of metal as results of chemical reaction between it and surrounding environment. When a metal is kept in exposed moist air then gases present in air react with metal surface and form a layer of metal oxides, sulphate or nitrate.



For example, reddish brown color rust is form on iron rod when it comes in water contact this is called as corrosion

### 2 A. Question

Give scientific reasons.

Gold and silver are used in coins.

#### Answer

- Gold and silver has property of malleability.
- They have longer life.
- They have better reflectivity other than any metal.
- They can be beaten in thin sheet, thin wires and can be given in desired shape.

That's why gold and silver are used for coins.

### 2 B. Question

Give scientific reasons.

Ornaments are generally not made from 24-carat gold.

#### Answer

- 24-carat gold has 100% purity.
- It is very soft (strong ductile property).
- If ornaments made of soft metal they can break and bend easily.

That's why ornaments are generally not made from 24-carat gold.

## 2 C. Question

Give scientific reasons.

Ships are painted at frequent intervals.

### Answer

- Ships are made of iron.
- Sea water consists of salts.
- When ships comes directly contact with sea salty water there will chemical reaction and ships rust or corrode.
- Paints consist of zinc and magnesium that prevent from rust or corrosion.

That's why ships paint at frequent interval.

## 2 D. Question

Give scientific reasons.

Gold and platinum are called noble elements.

### Answer

Noble elements are those elements which are resistant with corrosion and oxidation of air.

- Gold and platinum don't take part in any chemical reaction.
- They are not affected by heat, air, water, acid and base.

That's why gold and platinum are called noble elements.

## 2 E. Question

Give scientific reasons.

Stainless steel has more lustre than iron.

### Answer

- (a) Stainless steel is an alloy which is mixture of iron, chromium, carbon and nickel and but iron is metal.
- (b) When iron is exposed in moist air a reddish coating is formed on its surface that is called rust and loses its lustre.
- (c) Stainless steel prevents from rust and save its lustre property.

## 3. Question

Match the following.

'A'	'B'
(a) Mercury	1. Alloy of iron, carbon, nickel, chromium
(b) Graphite	2. Alloy of iron and carbon
(c) Sulphur	3. The 'lead' in a pencil
(d) Steel	4. Medicines
(e) Stainless steel	5. Thermometer

### Answer

'A'	'B'
(a) Mercury	5. Thermometer
(b) Graphite	3. The 'lead' in a pencil
(c) Sulphur	4. Medicines
(d) Steel	2. Alloy of iron and carbon
(e) Stainless steel	1. Alloy of iron, carbon, nickel, chromium

#### 4. Question

Fill in the blanks.

- Gold of 100% purity is \_\_\_\_\_ carat gold.
- Bronze contains the metals \_\_\_\_\_ and \_\_\_\_\_.
- The \_\_\_\_\_ gas is released when metals react chemically with acids
- Oxides of metals have \_\_\_\_\_ properties.
- The non-metal \_\_\_\_\_ is used in gun powder.

#### Answer

- Gold of 100% purity is **24** carat gold.
- Bronze contains the metals **copper** and **tin**
- The **hydrogen** gas is released when metals react chemically with acids
- Oxides of metals have **basic** properties.
- The non-metal **sulphur** is used in gun powder.

#### Activities

##### 1. Question

Find out which metals are used to make varakh, the shiny foil that is used to garnish sweetmeats.

#### Answer

Silver metal has property of malleability and ductility. It can be beaten and formed in thin sheets or thin silver foils. So silver metal is used for garnish the sweets.



##### 2. Question

Find out how varakh is made.

#### Answer

- Varakh is super fine foil sheet of pure metals.
- It is made from silver or sometimes of gold.
- It is used to decorate sweets and food to make those look more appealing and appetising.
- Varakh is made by pounding silver to sheets a few micrometers.
- It is made by placing the pure metal dust between parchment sheets, then pounding the sheets until the metal dust mold into a foil.
- It's thickness usually a few micrometers ( $\mu\text{m}$ ), typically  $0.2\ \mu\text{m}$ - $0.8\ \mu\text{m}$ .

##### 3. Question

Find out which metal on the basis of health considerations, should be used to make varakh.

### Answer

- Gold and silver are approved food foils in the European Union, as E175 and E174 additives respectively.
- The independent European food-safety certification agency has deemed gold leaf safe for consumption.
- These inert precious metal foils are not considered toxic to human beings nor to broader ecosystems.
- The use of edible silver or gold as *vark* is not considered harmful to the body.

### 4. Question

Observe how the metal tyre is fitted on the wheel of a bullock-cart.

### Answer

- The increase in temperature causes the metal to expand hence the ring becomes large enough to perfectly fit on the wheel. . At this point the obvious happens, the wooden wheel starts to burn
- Now it is allowed to cool and the metal contracts as it cool, squishing the wheel tightly. The tyre shrinks back to its original size and tightens the wheel joints creating a strong and durable wheel.
- Now we have a metal tyre on the wheel of a bullock cart, which doesn't slide off.

### 5. Question

Cooking vessels are made of various metals. Which foods are made in the vessels of which of the following metals: aluminium, copper, iron, stainless steel, brass?

### Answer

a) Aluminium = Large light weight pots with a tight lid are the best for popping popcorn in. Aluminium fry pans are excellent for frying delicate vegetables like cauliflower and broccoli.



b) Copper = These cookware should only be used as ornaments and never used in any kind of cooking. Copper oxidizes forming toxic copper oxide compounds that readily leaches into the food. Copper is safe to use if it is encapsulated in aluminium or stainless steel as a heat distribution core.



c) Stainless steel

i. Stainless steel (no core) = Sauce pans and boiling vegetables and sauces.

ii. Stainless steel (Aluminum or Copper encapsulated core) = Stock pots, roasting pans, and fry pans. Stainless steel is light weight and easy to clean of the metals.



d) Iron = Very heavy, a bit hard to clean, can't clean in a dishwasher as we will destroy the seasoning treatment on its surface. We can cook almost anything in cast iron so long as no tomatoes, vinegar or citrusy fruits are not an ingredient in cooking for the very same .



e) Brass= It is safe to cook food in brass utensils if it is just a short period of cooking. It is not advisable to cook in brass utensils for a longer period of cooking or for longer period of storage.

