

# Metallurgy

## Question1

**Metal  $X$  obtained from sphalarite ore can be purified by which of the following method?**

**TG EAPCET 2025 (Online) 2nd May Evening Shift**

**Options:**

A.

Distillation

B.

Poling

C.

Zone refining

D.

Vapour phase refining

**Answer: A**

**Solution:**

Zinc is obtained from sphalerite ore by distillation method.

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## Question2

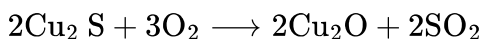
**Identify the reaction, which is not related to extraction of copper**

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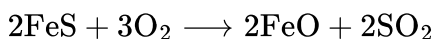


### Options:

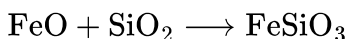
A.



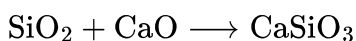
B.



C.



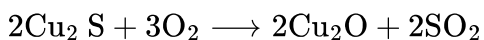
D.



**Answer: D**

### Solution:

Reaction (a) i.e



copper extraction via roasting.

Reaction (b) i.e

$2\text{FeS} + 3\text{O}_2 \longrightarrow 2\text{FeO} + 2\text{SO}_2$  is use to remove iron oxide from copper ore.

Reaction (c) i.e

$\text{FeO} + \text{SiO}_2 \longrightarrow \text{FeSiO}_3$  is removal of slag in copper extraction.

$\text{SiO}_2 + \text{CaO} \longrightarrow \text{CaSiO}_3$  is not related to copper extraction.

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## Question3

### Match the following

List I (Alloy)	List II (Use)
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A Li-Pb	I. In aircraft construction
B Be-Cu	II. To make bearings for motor engines
C Mg-Al	III. To make tetraethyl lead
D Na-Pb	IV. To make high strength springs

**The correct answer is**

## TG EAPCET 2024 (Online) 11th May Morning Shift

**Options:**

A. A-II; B-IV; C-III; D-I

B. A-II; B-IV; C-I; D-III

C. A-IV; B-I; C-II; D-III

D. A-III; B-II; C-I; D-IV

**Answer: B**

**Solution:**

The correct matching of alloys (List I) with their uses (List II) is:

**A (Li-Pb) - III (To make tetraethyl lead):** Lithium-lead alloys are primarily used in the production of tetraethyl lead, a gasoline additive (although its use is now largely phased out due to environmental concerns).

**B (Be-Cu) - IV (To make high strength springs):** Beryllium-copper alloys possess high strength, excellent electrical conductivity, and good fatigue resistance, making them ideal for applications requiring high-strength springs.

**C (Mg-Al) - I (In aircraft construction):** Magnesium-aluminum alloys are lightweight and relatively strong, properties highly desirable in aircraft construction for fuel efficiency and structural integrity.

**D (Na-Pb) - II (To make bearings for motor engines):** Sodium-lead alloys, while not as common as other alloy types listed, find applications in specialized bearings due to their unique material properties under specific operating conditions. Their use in bearings for motor engines is a possible application, though less prevalent than others.

Therefore, the correct answer is **Option B: A-III; B-IV; C-I; D-II**. Note that while the original provided answer key listed D-III, the more accurate match for D (Na-Pb) is II, considering the context and common applications of the alloys.

## Question4

Copper matte is mixture of

**TG EAPCET 2024 (Online) 11th May Morning Shift**

**Options:**

- A. oxides of Cu and Fe
- B. carbonates of Cu and Fe
- C. sulphides of Cu and Fe
- D. silicates of Cu and Fe

**Answer: C**

**Solution:**

Copper matte is a mixture of sulphides of copper and iron. ( $\text{Cu}_2\text{S} + \text{FeS}$ )

Matte is a kind of mixture in which element is extracted before the final reduction.

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## Question5

Among the following the calcination process is

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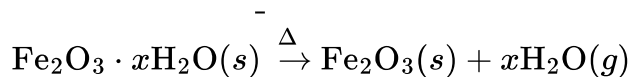
**Options:**

- A.  $2\text{Cu}_2\text{S} + 3\text{O}_2 \xrightarrow{\Delta} 2\text{Cu}_2\text{O} + 2\text{SO}_2 \uparrow$
- B.  $\text{Al}_2\text{O}_3(\text{s}) + 2\text{NaOH}(\text{aq}) + 3\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{Na}[\text{Al}(\text{OH})_4](\text{aq})$
- C.  $2\text{CuFeS}_2 + \text{O}_2 \rightarrow \text{Cu}_2\text{S} + 2\text{FeS} + \text{SO}_2 \uparrow$
- D.  $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}(\text{s}) \rightarrow \text{Fe}_2\text{O}_3(\text{s}) + x\text{H}_2\text{O}(\text{g})$

**Answer: D**

**Solution:**

Calcination is the process in which the ore (hydrated, carbonate or bicarbonate) of the metal is heated to a high temperature in absence or limited supply of air.



## Question6

**Kaolinite is a silicate mineral of metal ' X ' and calamine is a carbonate mineral of metal ' Y ', X and Y respectively are**

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**Options:**

A. Fe, Cu

B. Zn, Al

C. Al, Zn

D. Zn, Cu

**Answer: C**

**Solution:**

Kaolinite is a clay mineral with chemical formula  $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$ . It is a silicate mineral with Al metal.

Calamine is a lotion used in medical field for itching treatment.

It has chemical composition of  $\text{ZnCO}_3$ .

It is a carbonate mineral of zinc metal.

Hence, X is aluminium and Y is zinc.

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## Question7

**The major components of cement are**

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**Options:**

- A.  $\text{SiO}_2, \text{Al}_2\text{O}_3$
- B.  $\text{SiO}_2, \text{Fe}_2\text{O}_3$
- C.  $\text{Al}_2\text{O}_3, \text{Fe}_2\text{O}_3$
- D.  $\text{SiO}_2, \text{CaO}$

**Answer: D**

### **Solution:**

The major component of cements are silicon dioxide and calcium oxide.  $\text{SiO}_2$  is present in 61-67%.  $\text{CaO}$  is in 19 – 23% composition.

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## **Question8**

**A low boiling point metal contains high boiling point metal as impurity. The correct refining method is**

**TG EAPCET 2024 (Online) 9th May Morning Shift**

### **Options:**

- A. liquation
- B. distillation
- C. poling
- D. vapour phase refining

**Answer: B**

### **Solution:**

Distillation process works when low melting point metal contain high boiling point impurities.

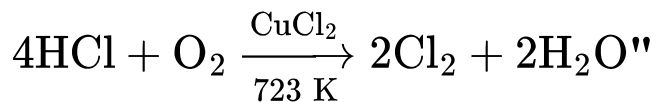
Low boiling metals e.g. zinc and mercury containing high boiling point impurities is separated by distillation, and pure metal is collected as distillate.

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## Question9

"Observe the following reaction. This reaction represents



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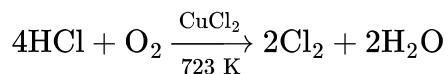
**Options:**

- A. van-Arkel process
- B. Serpeck's process
- C. Hall-Heroult process
- D. Deacon's process

**Answer: D**

**Solution:**

Deacon's process It is a process to obtain chlorine gas.



## Question10

Match the following.

List-I		List-II	
(Refining method)		(Metals to be refined)	
(A)	Zone refining	(I)	Titanium
(B)	Poling	(II)	Tin
(C)	Liquation	(III)	Gallium
(D)	Vapour phase refining	(IV)	Copper

**The correct answer is**



## TS EAMCET 2023 (Online) 12th May Evening Shift

### Options:

A. A-IV, B-II, C-I, D-III

B. A-III, B-I, C-IV, D-II

C. A-III, B-IV, C-II, D-I

D. A-II, B-IV, C-I, D-III

**Answer: C**

### Solution:

The correct match is A-III, B-IV, C-II, D-I.

Zone refining is used for the purification of metals like Si, Ge, Ga which are used in semiconductors.

Poling is used to purify metal like copper that are in impure form of a copper oxide. Liquation is the method in which low melting point metal like tin can be made to flow on a sloping surface.

Vapour phase refining is used for refining titanium metal. First metal is converted to volatile compound and collected. Next, it is then decomposed to give pure metal.

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## Question11

**Sphalerite, siderite and malachite are the ores of metals  $X$ ,  $Y$  and  $Z$ .  
The atomic numbers of them are respectively**

## TS EAMCET 2023 (Online) 12th May Morning Shift

### Options:

A. 30, 26, 29

B. 26, 30, 29

C. 30, 29, 26

D. 29, 30, 26

**Answer: A**



## Solution:

Let's analyze each ore to identify the metal and then its atomic number:

Sphalerite is primarily a zinc ore (its chemical formula is  $ZnS$ ). Zinc has an atomic number of 30.

Siderite is an ore of iron (its chemical formula is  $FeCO_3$ ). Iron has an atomic number of 26.

Malachite is a copper ore (its basic composition includes copper, as in  $Cu_2CO_3(OH)_2$ ). Copper has an atomic number of 29.

Thus, the atomic numbers for metals  $X, Y, Z$  (corresponding to sphalerite, siderite, and malachite) are:

30, 26, 29

So the correct answer is Option A.

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