

## Refining Chemistry Questions with Solutions

**Q1.** Which of the following impurity is not present in the crude metals?

- (a) Other metals
- (b) Pine oil
- (c ) Unreacted oxides
- (d) None of the above

**Answer:** (b) Pine oil is not present in crude metals. Non-metals like silicon, phosphorus, and unreacted oxides of the metals are present in the crude metals.

**Q2.** Which of the following metals cannot be refined by distillation?

- (a) Tin
- (b) Zinc
- (c ) Mercury
- (d) None of the above

**Answer:** (a) Tin cannot be refined by distillation.

**Q3.** Zone refining is also known as fractional crystallisation.

- (a) True
- (b) False
- (c ) Neither true nor false
- (d) None of the above

**Answer:** (a) True. Zone refining is also known as fractional crystallisation.

**Q4.** Which of the following electrolyte is used during the electrolytic refining of copper?

- (a) Copper sulphate solution acidified with sulphuric acid
- (b) Copper sulphate solution
- (c ) Sulphuric Acid
- (d) None of the above

**Answer:** Copper sulphate solution acidified with sulphuric acid is used during the electrolytic refining of copper.

**Q5.** Which of the following can not be refined by the zone refining?

- (a) Germanium
- (b) Silicon
- (c ) Gold
- (d) None of the above

**Answer:** (c ) Gold can not be refined by the zone refining.

**Q6.** Why is zone refining carried out in an inert atmosphere?

- (a) To prevent oxidation of metal
- (b) To prevent reduction of metal
- (c) To reduce the external temperature
- (d) To reduce the superficial pressure

**Answer:** (a) Zone refining carried out in an inert atmosphere to prevent oxidation of the metal.

**Q7.** What is refining?

**Answer:** Refining is a process of removing impurities to obtain a metal of high purity. We can remove it from the crude metal in numerous ways established on the metal and impurity properties. We can use the following techniques to purify crude metals.

1. Distillation
2. Electrolysis
3. Vapour phase refining
4. Liquation
5. Zone refining
6. Chromatographic methods

**Q8.** Why do we convert a sulphide ore to oxide before reduction?

**Answer:** We convert a sulphide ore to oxide before reduction because sulphide does not reduce while oxides reduce readily.

**Q9.** What is flux? Explain its necessity in the refining process.

**Answer:** Flux is a substance added to the smelting of ores to facilitate fluidity and vacate impurities in the form of slag.

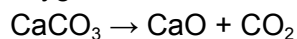
The primary function of flux is to remove gangue. Moreover, it also makes the molten mass more conducting.

**Q10.** What is the chemical formula of bauxite?

**Answer:** The chemical formula of bauxite is  $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ . It is an essential ore of aluminium.

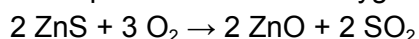
**Q11.** What is calcination?

**Answer:** Calcination is the process in which ore is heated without air or a limited quantity of air or oxygen.



**Q12.** What is roasting?

**Answer:** Roasting is the process of heating a sulfide ore to a high temperature below its melting point in the presence of air or oxygen.



**Q13.** Match the following.

Column A	Column B
$R_2C = CR_2 \rightarrow R_2CHCHR_2$	Roasting
$ZnCO_3 \rightarrow ZnO + CO_2$	Calcination
$2 ZnS + 3 O_2 \rightarrow 2 ZnO + 2 SO_2$	Thermite process
$Fe_2O_3 + 2 Al \rightarrow 2 Fe + Al_2O_3$	Addition reaction

**Answer:**

Column A	Column B
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**Q14.** What are the primary steps of metal extraction from its ore?

**Answer:** The primary step of extracting metal from its ore is mentioned below.

1. Crushing of the ore
2. The concentration of the ore
3. Reduction or isolation of the crude metal from its ore
4. Purification or refining of the metal

**Q15.** How will you differentiate between calcination and roasting?

**Answer:** We can distinguish between calcination and roasting in the following ways.

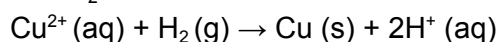
S. No.	Calcination	Roasting
1.	Calcination is a process in which ore is heated without air or a limited quantity of air.	Roasting involves heating ore below its melting point in the presence of air or oxygen.
2.	Calcination involves the thermal decomposition of carbonate ores.	Roasting is carried out mostly for sulfide minerals.
3.	During calcination, moisture is	Roasting does not involve

	driven out from an ore.	dehydration of ore.
4.	$\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$	$2 \text{ZnS} + 3 \text{O}_2 \rightarrow 2 \text{ZnO} + 2 \text{SO}_2$
5.	Carbon dioxide is given out during calcination.	During roasting, many toxic metallic and acidic compounds are released.

## Practise Questions on Refining

**Q1.** How is copper extracted from low-grade copper ore?

**Answer:** Copper is extracted from low-grade copper ore using the hydrometallurgy method. For this purpose, the ore is leached out using bacteria. The solution containing  $\text{Cu}^{2+}$  is treated with scrap iron and  $\text{H}_2$ .



**Q2.** What are the two fundamental necessities of refining metal by the Mond and Van Arkel process?

**Answer:** The two primary conditions of refining metal by the Mond and Van Arkel process are

1. Metal should form a volatile compound with the available reagent.
2. The volatile compound should be easily decomposable to be recovered quickly.

Mond's process includes converting Ni to  $\text{Ni}(\text{CO})_4$  and then decomposition of  $\text{Ni}(\text{CO})_4$  to Ni. In contrast, Van Arkel's method includes converting Zr to volatile  $\text{ZrI}_4$  and then decomposition  $\text{ZrI}_4$  to Zr and  $\text{I}_2$ .

**Q3.** What are the two fundamental necessities of refining metal by vapour phase refining?

**Answer:** The two fundamental necessities of refining metal by vapour phase refining are

1. The metal should form a volatile compound with an available reagent.
2. The volatile compound should be quickly recovered by decomposition.

**Q4.** Which of the following method can be used to prepare copper of high purity?

- (a) Thermite process
- (b) Hydrogen reduction
- (c) Electrolytic reduction
- (d) None of the above

**Answer:** (c) Electrolytic reduction can be used to prepare copper of high purity.

**Q5.** Which of the following process is not used for the purification of Bauxite?

- (a) Beyer method
- (b) Hall method
- (c) Frankland method

(d) None of the above

**Answer:** (c ) Frankland method is not used for the purification of Bauxite.

