



General Principles and Processes of Isolation of Elements Important Questions With Answers

NEET Chemistry 2023

1. During the process of electrolytic refining of copper, some metals present as impurity settle as anode mud: These are:

- a) Sn and Ag b) Pb and Zn **c) Ag and Au** d) Fe and Ni

Solution : -

In the electrolytic refining of copper the more electropositive impurities like Fe, Zn, Ni, Co, etc. dissolve in the solution and less electropositive impurities such as g, Au and Pt collect below the anode in the form of anodic mud.

2. Assertion: Reduction of a metal oxide is easier if the metal formed is in liquid state at the temperature of reduction.

Reason : The entropy is higher if the metal is in liquid state.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

3. Which of the following compounds is used as the starting material for the preparation of potassium dichromate?

- a) $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$ (Chrome alum) b) $PbCrO_4$ (Chromite yellow) **c) $FeCr_2O_4$ (Chromite)**
d) $PbCrO_4 \cdot PbO$ (Chrome red)

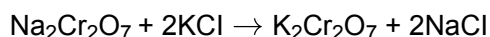
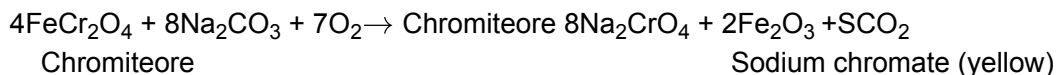
4. Potassium dichromate is prepared from

a) chromate obtained by the fusion of chromite ore with sodium carbonate in free access of air

b) pyrolusite which is fused with potassium hydroxide in the presence of air

c) iron pyrites by the fusion with potassium carbonate in presence of moisture d) none of these.

Solution : -



Potassium
dichromate

5. Which of the following is magnetite?

- a) Fe_2CO_3 b) Fe_2O_3 **c) Fe_3O_4** d) $Fe_2O_3 \cdot 3H_2O$

6. In electro-refining of copper, some gold is deposited as

- a) cathode mud b) electrolyte **c) anode mud** d) cathode.

Solution : -

In electro-refining of copper, the zinc, nickel and iron remain in the solution, while gold is deposited as anode mud. The anode decreases in weight gradually.

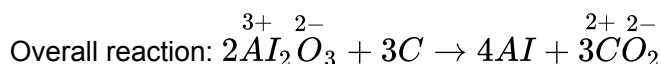
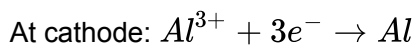
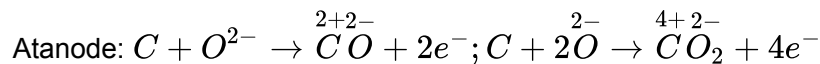
7. The metal oxide reacts with a _____ The oxide is _____ to metal and reducing agent is _____ Net Gibbs energy change is _____
- a) reducing agent, oxidised, reduced, negative **b) reducing agent, reduced, oxidised, negative**
 c) oxidising agent, reduced, oxidised, positive d) reducing agent, reduced, oxidised, positive

8. In the metallurgy of aluminium

- a) Al^{3+} is oxidised to $Al_{(s)}$ **b) graphite anode is oxidised to carbon monoxide and carbon dioxide**
 c) oxidation state of oxygen changes in the reaction at anode
 d) oxidation state of oxygen changes in the overall reaction involved in the process.

Solution : -

The oxidation state of O does not change in either the reaction occurring at the anode or the overall reaction as shown below



9. Which of the following is not a method of refining of metals?

- a) Electrolysis **b) Smelting** c) Poling d) Liquation

Solution : -

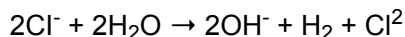
Smelting is a process used for reduction of oxide to convert it into metal

10. Extraction of chlorine from brine is based on:

- a) reduction b) displacement **c) oxidation** d) evaporation.

Solution : -

The extraction of chlorine from brine is based on oxidation.



11. Which of the following metals cannot be obtained by electrolysis

- a) Cr** b) Na c) Ca d) Mg

Solution : -

Active metals can be obtained by electrolysis.

12. An ore of tin containing, $FeCrO_4$ is concentrated by

- a) gravity separation **b) magnetic separation** c) froth floatation d) leaching.

Solution : -

$FeCrO_4$ is magnetic and tin is non-magnetic hence it can be separated by magnetic separation.

13. Zone refining is based on the principle that _____

- a) impurities of low boiling metals can be separated by distillation
b) impurities are more soluble in molten metal than in solid metal
 c) different components of a mixture are differently adsorbed on an adsorbent
 d) vapours of volatile compound can be decomposed in pure metal

14. The main difference between cast iron and pig iron is

- a) cast iron is purest form of iron while pig iron is impure

b)

cast iron has lower carbon content (3%) as compared to pig iron (4%) and is extremely hard and brittle

c)

pig iron contains many impurities like S, P, Si and Mn while cast iron does not contain any impurity and can be casted into any shape

- d) cast iron is soft and malleable while pig iron is extremely hard and brittle

Solution : -

Pig iron contains about 4% C and many other impurities like S, P Si and Mn. Cast iron is made by melting pig iron with scrap iron and coke. It has slightly lower carbon content (3%) and is extremely hard and brittle.

15. Assertion: In the metallurgy of aluminium, purified Al_2O_3 is mixed with Na_3AlF_6 or CaF_2
Reason: Na_3AlF_6 or CaF_2 lowers the melting point of mixture and increase its conductivity.
- a) **If both assertion and reason are true and reason is the correct explanation of assertion.**
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

16. Below point 'A' FeO can _____ .
- a) **be reduced by carbon monoxide only** b) be reduced by both carbon monoxide and carbon
c) be reduced by carbon only d) not be reduced by both carbon and carbon monoxide

Solution : -

Below point 'A' FeO can be reduced by carbon monoxide only as the curve of formation of CO_2 from CO lies below the oxidation curve of Fe.

17. The method of zone refining of metals is based on the principle of:
- a) greater noble character of the solid metal than that of the impurity
b) **greater solubility of the impurity in the molten state than in the solid**
c) greater mobility of the pure metal than that of impurity
d) higher melting point of the impurity than that of the pure metal

Solution : -

Zone refining of metals is based on the principle that the impurities are soluble to greater extent in molten state than in the solid.

18. Which of the following is not an example of roasting?
- a) $2\text{ZnS} + 3\text{O}_2 \rightarrow 2\text{ZnO} + 2\text{SO}_2$ b) $2\text{PbS} + 3\text{O}_2 \rightarrow 2\text{PbO} + 2\text{SO}_2$ c) $2\text{Cu}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{Cu}_2\text{O} + 2\text{SO}_2$
d) **$2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \rightarrow 6\text{Cu} + \text{SO}_2$**

Solution : -

It is an example of auto-reduction in which unoxidised copper sulphide reduces copper oxide.

19. Which of the following is not a carbonate ore?
- a) Dolomite b) Calamine c) Siderite d) **Zincite**

Solution : -

Zincite is ZnO .

20. Which one of the following is true in electrolytic refining?
- a) Impure metal is made cathode. b) **Impure metal is made anode**
c) Impure metal is made cathode and pure metal as anode d) Both electrodes must be of pure metal

Solution : -

Impure metal is made the anode and a Solution containing a salt of the same metal is used as an electrolyte.

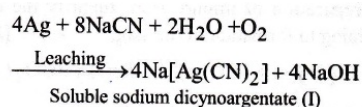
21. Sometimes it is possible to separate two sulphide ores by adjusting the proportion of oil to water or by using depressants. When a depressant NaCN is added to an ore containing ZnS and PbS , what is the correct observation?
- a) NaCN prevents PbS from coming to the froth but allows ZnS to come with froth.
b) **NaCN prevents ZnS from coming to the froth but allows PbS to come with froth**
c) NaCN prevents frothing of both ZnS and PbS , hence no froth is formed.
d) NaCN does not act as depressant hence a mixture of PbS and ZnS is found in froth

22. Which of the following changes take place during roasting?
 (i) Impurities are removed as their volatile oxides.
 (ii) Ore is converted into its oxide.
 (iii) Changes like oxidation, chlorination, etc. take place.
 a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) **d) (i), (ii) and (iii)**
23. Cryolite and fluorspar are mixed with Al_2O_3 during electrolysis for extraction of aluminium to
 a) increase the mass of the reaction mixture b) get other products at anode like fluorine
c) lower the melting point and increase the conductivity of the electrolyte
 d) reduce aluminium oxide by cryolite
24. Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by
 a) Distillation **b) Zone Refining** c) Displacement with Zn d) Liquefaction

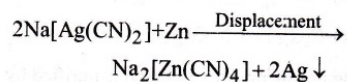
Solution : -

Ag and Au being less than reactive Zn.

Reaction:



Again $\text{Na}[\text{Ag}(\text{CN})_2]$ can be treated with Zn.



25. In metallurgical process, aluminium acts as
 a) an oxidising agent **b) a reducing agent** c) acidic flux d) basic flux.

Solution : -

Metals like Al, Na, K, Mg act as reducing agents in metallurgical processes

26. Sulphides ores are converted to oxides before reduction. This is explained on the basis of which of the following?
a) Sulphides cannot be reduced easily while oxides can be reduced easily
 b) Sulphides decompose on reduction hence they are first converted to oxides.
 c) Sulphide ores have higher melting points than oxides
 d) Oxides are more stable than sulphides hence easy to reduce

Solution : -

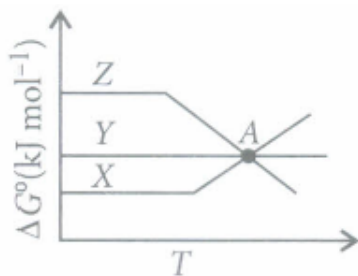
Thermodynamically based on Ellingham diagram it is observed that sulphides cannot be reduced easily as compared to oxides

27. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?
 a) The ΔG_f^0 of the sulphide is greater than those for CS_2 and H_2S .
 b) The ΔG_f^0 is negative for roasting of sulphide ore to oxide.
 c) Roasting of the sulphide to the oxide is thermodynamically feasible
d) Carbon and hydrogen are suitable reducing agents for metal sulphides

Solution : -

Before reduction the Sulphide ore is roasted to oxide because the ΔG_f^0 of most of the sulphides are greater than those of CS_2 and H_2S , therefore neither C nor H can reduce metal sulphide to metal. Further, the standard free energies of formation of oxide are much less than those of SO_2 . Thus oxidation of metal sulphides to metal oxide is thermodynamically favourable.

28. In the following Ellingham diagram, X, Y and Z represent graphs for metal oxides. Select the correct option before point A.



- a) **Y will reduce oxide of Z.** b) Y will reduce oxide of X. c) Z will reduce oxide of X.
d) Z will reduce oxide of Y

Solution : -

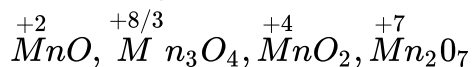
ΔG° of Y is less than Z.

29. Arrange the oxides of manganese according to increasing acidic strength.

- a) **MnO < Mn₃O₄ < Mn₂O₃ < MnO₂ < Mn₂O₇** b) Mn₂O₇ < MnO₂ < Mn₂O₃ < Mn₃O₄ < MnO
c) MnO₂ < Mn₂O₇ < Mn₃O₄ < Mn₂O₃ < MnO d) Mn₃O₄ < Mn₂O₃ < Mn₂O₇ < MnO₂ < MnO

Solution : -

Acidic strength of oxides of transition metals increases with increase in oxidation number.



Hence acidic strength is of the order of



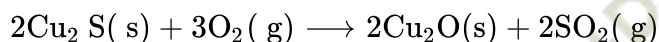
(Basic) (Amphoteric) (Acidic)

30. In the extraction of copper from its sulphide ore, the metal finally obtained by the reduction of cuprous oxide with

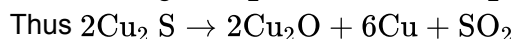
- a) **Iron (ii) sulphide** b) Carbon monoxide c) Copper (i) sulphide d) Sulphur dioxide

Solution : -

Reaction:



The unchanged Cu₂S, reacted with Cu₂O and heated strongly in absence of air.



31. Which of the following metals cannot be obtained by reduction of its metal oxide by aluminium?

- a) Cr b) Mn c) **Fe** d) Mg

Solution : -

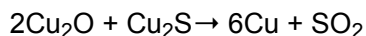
Since reduction potential of Al is more than that of Mg and less than other given metals. So it cannot reduce Mg from its oxide

32. Blister copper obtained during extraction from cuprous oxide is called so because

- a) **it has blister like eruptions due to evolution gas.** b) it has a shining surface like blister
c) it is the most impure form of copper d) its surface is uneven due to different thickness at different places

Solution : -

Solidified copper obtained is called blister copper since it has blistered appearance due to the evolution of sulphur dioxide gas.



33. Which one of the following elements constitutes a major impurity in pig iron?

- a) Silicon b) Oxygen c) Sulphur d) **Graphite**

Solution : -

Graphite produces impurity in pig iron.

34. Four metals and their methods of refinement are given,

(i) Ni, Cu, Zr, Ga

(ii) electrolysis, van Arkel process, zone refining, Mend's process

Choose the right method for each

Ni: Electrolysis, Cu : van Arkel process, **Ni : Mond's process, Cu : Electrolysis,**

a) Zr : Zone refining, Ga : Mend's process **b) Zr : van Arkel process, Ga : Zone refining**

Ni : Mond's process, Cu : van Arkel process, Ni: Electrolysis, Cu : Zone refining,

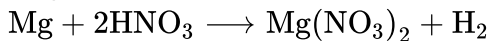
c) Zr : Zone refining, Ga : Electrolysis d) Zr: van Arkel process, Ga : Mend's process

35. Which of the following metal evolves hydrogen on reacting with cold dilute HNO_3 ?

a) Mg b) Al c) Fe d) Cu

Solution : -

Magnesium react with cold and dilute nitric acid to form hydrogen



36. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

a) Carbon and hydrogen are suitable reducing agents for metal sulphides

b) The $\Delta_f G^0$ of the sulphide is greater than those for CS_2 and H_2S

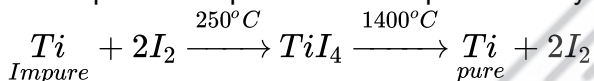
c) The $\Delta_f G^0$ is negative for roasting of sulphide ore to oxide

d) Roasting of the sulphide to the oxide is thermodynamically feasible

Solution : -

Carbon and hydrogen are not suitable reducing agents for metal sulphides.

37. Which process of purification is represented by the following reaction?



a) Zone refining b) Mond's process c) Cupellation **d) van Arkel process**

38. Which of the following is a halide ore?

a) Cassiterite b) Anglesite c) Siderite **d) Carnallite**

Solution : -

Carnallite is $\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$.

39. The significance of leaching in the extraction of aluminium is:

a) it helps removing the impurities like SiO_2 , Fe_2O_3 , etc from the bauxite ore

b) it converts the ore into oxide c) it reduces melting point of the ore d) it eliminates water from bauxite.

40. "Metals are usually not found as nitrates in their ores." Out of the following two (I and II) reasons which is/are true for the above observation?

I. Metal nitrates are highly unstable

II. Metal nitrates are highly soluble in water.

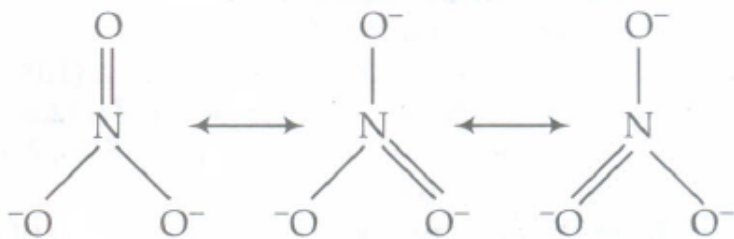
a) I and II are true b) I and II are false **c) I is false but II is true** d) I is true but II is false

Solution : -

Metals are not found as nitrates in their ores because metal nitrates are highly soluble in water. e.g., KNO_3 dissociates as



The nitrate anion has three equivalent oxygen surrounding a central nitrogen atom. This tends to spread the single negative charge and make it easier for water to separate the ions in solution.



41. The powdered ore is agitated with water or washed with running stream of water. The heavy ore particles and lighter impurities are separated. This method of concentration is known as
 a) metallurgy b) leaching **c) gravity separation** d) froth floatation process
42. During a column chromatography through Al_2O_3 column, a mixture of components A, B and C is passed through the column. On adding eluant, compound 'A' is eluted first then 'B' and in the end 'C'. Which of the following statements regarding the components is correct.
a) The order of adsorption of A, B and C is C>B>A. b) The order of adsorption of A, B and C is A>B>C.
 c) The order of adsorption of A, B and C is B>A>C. d) The order of adsorption of A, B and C is B>C>A.

Solution : -

Since compound 'A' comes out before 'B', 'B' is more readily adsorbed to the column and 'B' comes out before 'C', hence 'C' is more readily adsorbed than 'B'. Hence, the order of adsorption is $C > B > A$.

43. Match the column I with column II to match the method of extraction and mark the appropriate choice

Column-I	Column-II
A Cu	(i) Direct reduction of sulphide by heating
B Sn	(ii) Electrolysis of fused chloride and fluoride
C Hg	(iii) Partial oxidation of sulphide ore
D Ca	(iv) Reduction of oxide with carbon

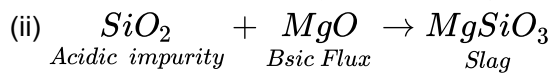
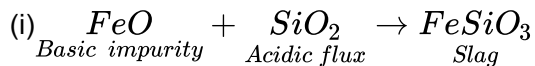
- a) (A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (ii), (D) \rightarrow (iv) **b) (A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (i), (D) \rightarrow (ii)**
 c) (A) \rightarrow (i), (B) \rightarrow (iii), (C) \rightarrow (ii), (D) \rightarrow (iv) d) (A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (ii), (D) \rightarrow (iii)
44. Assertion: Chromatography in general involves a mobile phase (a gas, a liquid or a supercritical fluid) and a stationary phase (like Al_2O_3 column).
 Reason : A component which is less soluble in stationary phase takes longer time to travel through it than the component which is more soluble in stationary phase
 a) If both assertion and reason are true and reason is the correct explanation of assertion.
 b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

Solution : -

A component which is quite soluble in the stationary phase, takes longer time to travel through it than a component which is not very soluble in the stationary phase but very soluble in the mobile phase

45. During the formation of the slag by the reaction of flux and impurities which of the following is an example of acidic and basic flux?
 $\text{FeO} + \text{SiO}_2 \rightarrow \text{FeSiO}_3$
 $\text{SiO}_2 + \text{MgO} \rightarrow \text{MgSiO}_3$
a) (i) SiO_2 - Acidic flux (ii) MgO - Basic flux b) (i) SiO_2 - Basic flux (ii) MgO - Acidic flux
 c) (i) SiO_2 - Basic flux (ii) MgO - Basic flux d) (i) SiO_2 - Acidic flux (ii) MgO - Acidic flux

Solution : -

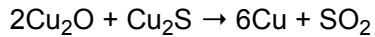
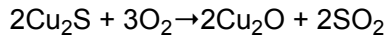


46. Why is partial roasting of sulphide ore done in metallurgy of copper?

- a) Auto-reduction of Cu-O formed is carried out by remaining Cu_2S in the reaction.**
 b) Cu is separated out by partial reduction due to sedimentation.
 c) Due to difference in gravity Cu_2O and Cu_2S are separated.
 d) Complete roasting cannot be done in one step hence partial roasting is done

Solution : -

Partial roasting of sulphide ore forms some oxide. This oxide then reduces the remaining sulphide ore into metal.



This process is called auto reduction.

47. Cassiterite is an ore of:

- a) Mn b) Ni c) Sb **d) Sn**

Solution : -

Cassiterite is an ore of Sn with chemical composition SnO_2 .

48. Sulphide ore of zinc/copper is concentrated by

- a) floatation process** b) electromagnetic process c) gravity separation d) distillation.

49. Mark the correct statements

- (i) Mercury can be refined by the process of distillation.
 (ii) In poling, the molten impure metal is stirred with green poles of wood.
 (iii) In electrolytic refining of metals, impure metal is made as cathode and a thin strip of pure metal is made as anode

- a) (i) and (ii)** b) (i) and (iii) c) (ii) and (iii) d) (i), (ii) and (iii)

Solution : -

In electrolytic refining of metals, impure metal is made as anode and a thin strip of pure metal is made as cathode.

50. Removal of the unwanted materials like sand, clays etc. from the ore is known as _____, _____, or _____.

- a) concentration, dressing, benefaction** b) separation, refining, gangue
 c) magnetic separation, purification, gangue d) washing, refining, amalgamation