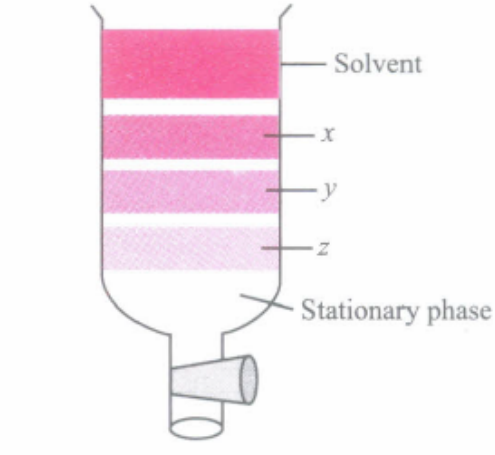
Time : 1 Mins **GENERAL PRINCIPLES AND PROCESS OF ISOLATION OF ELEMENTS 1** **Marks : 668**

1. 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.
2. Heating pyrites to remove sulphur is called
   a) smelting b) calcination c) liquation d) roasting.
3. Sulphide ores of metals are usually concentrated by froth floatation process. Which one of the following sulphide ores offers an exception and is concentration by chemical leaching?
   a) Argentite b) Galena c) Copper pyrite d) Sphalerite
4. Column chromatography involves separation of a mixture over a column of adsorbent (stationary phase) packed in a glass tube. Depending upon the degree of adsorption complete separation takes place. In the given column, three coloured bands x, y, z are formed. Identify the correct statement.



   a) x, y and z are adsorbed to the same extent.
   b) The most readily adsorbed component is retained near the top (x).
   c) The most readily adsorbed component comes down (z).
   d)
   x, y, z layers are formed according to the wavelengths of the colours not on the basis of adsorption.
5. Which of the following are main requirements for vapour phase refining?
   (i) Metal should form a volatile compound with the reagent.
   (ii) The volatile compound should be easily decomposable to give back pure metal.

(iii) Metal should be very reactive and form a stable compound with the reagent
a) (i), (ii) and (iii) b) (i) and (ii) c) (ii) and (iii) d) (i) and (iii)

6. Which of the following ores is concentrated by chemical leaching method?
   a) Cinnabar b) Argentite c) Copper pyrites d) Galena
7. One mole of acidified $K_2Cr_2O_7$ on reaction with excess KI will liberate mole(s) of L;
   a) 3 b) 1 c) 7 d) 2
8. How do we separate two sulphide ores by froth floatation method?
   a) By using excess of pine oil
   b) By adjusting proportion of oil to water or using depressant
   c) By using collectors and froth stabilisers like xanthates.
   d) By using some solvent in which one of the sulphides is soluble.
9. In electrometallurgy of aluminium, what will happen if graphite rods are not used as anode and are replaced by some other metal
   a) Ozliberated at anode will react with aluminium to give back Al_2O_3
   b) F_2 will be liberated at anode instead of O_2
   c) The process of electrometallurgy will become non -spontaneous
   d) Aluminium oxide splits into Al^{3+} and O^{2-} ions only in presence of graphite.
10. At 1000°C,
    $Zn_{(s)} + \frac{1}{2}O_{2(g)} \rightarrow ZnO_{(s)}; \triangle GO^o - 360KJmol^{-1}$
    $C_{(s)} + \frac{1}{2}O_{2(g)} \rightarrow CO_{(g)}; \triangle GO^o - 460KJmol^{-1}$
    The correct statement is
    a) zinc can be oxidised by carbon monoxide.
    b) zinc blend is produced during the reaction .
    c) zinc oxide can be reduced by graphite d) zinc can be oxidised by graphite
11. In blast furnace iron oxide is reduced by
    a) silica b) carbon monoxide c) carbon d) lime stone
12. Sulphide ores of metals are usually concentrated by froth flotation process. Which one of the following sulphide ores offer an exception and concentrated by chemical leaching
    a) Galena b) Copper pyrite c) Sphalerite d) Argentite
13. Magnesium oxide is used for the lining in steel making furnace because
    a) MgO acts as an acidic flux to remove impurities of Si, P and S
    b) MgO acts as a basic flux to remove impurities of Si, P and S
    c) MgO acts as an oxidising agent to remove impurities of oxides
    d) MgO does not react with any type of impurities.
14. Brine is electrolysed by using inert electrodes. The reaction at anode is_____
    a) $Cl^-_{(aq)} \rightarrow \frac{1}{2}Cl_{2(g)} + e^-; E^o_{cell} = 1.36V$ b) $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+ + 4e^-; E^o_{cell} = 1.23V$
    c) $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}; E^o_{cell} = 2.71V$ d) $H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_{2(g)}; E^o_{cell} = 0.00V$
15. Assertion: Gold and silver are extracted from their native ores by leaching.
    Reason: Both silver and gold particles dissolve in dilute solution of sodium cyanide in presence of oxygen.

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. Electrolytic refining is used to purify which of the; following metals?
a) Cu and Zn b) Ge and Si c) Zr and Ti d) Zn and Hg

17. Match the column I with column II and mark the appropriate choice.

Column-I		**Column-II**	
A)	Electrical industry	(i)	Zinc
B)	Batteries	(ii)	Steel
C)	Gutter pipes	(iii)	Copper
D)	Gas stoves	(iv)	Cast iron

a) (A) →(i), (B) →(ii), (C) →(iii), (D) →(iv) b) (A) →(ii), (B) →(iii), (C) →(iv), (D) →(i)
c) (A) →(iv), (B) →(iii), (C) →(ii), (D) →(i) d) (A) →(iii), (B) →(i), (C) →(iv),(D) →(ii)

18. Roasting of copper pyrite ores is for the following purpose
a)
to burn off sulphur, arsenic, antimony etc. as oxides and convert all the iron and copper to their oxides
b)
to burn off arsenic, antimony etc. as oxides and burn off sulphur so that enough of it remains to combine with all the copper
c)
to burn off sulphur partially, in order to leave enough of sulphur to combine with arsenic, antimony etc. and to convert all the iron and copper to oxides
d)
to melt arsenic and antimony sulphides etc. and remove them by liquation and to burn off sulphur partially to leave enough to combine with copper and iron.

19. Which of the following is used as a method of purification for silicon?
a) Electrolytic refining b) Liquation c) Zone refining d) Distillation

20. Match items of Column I with the items of Column II and assign the correct code:

Column I	**Column II**
(A) Cyanide process	(i) Ultrapure Ge
(B) Froth floatation process	(ii) Dressing of ZnS
(C) Electrolytic reduction	(iii) Extraction of Al
(D) Zone refining	(iv) Extraction of Au
	(v) Purification of Ni

a)

A	B	C	D
(i)	(ii)	(iii)	(iv)

b)

A	B	C	D
(iii)	(iv)	(v)	(i)

c)

A	B	C	D
(iv)	(ii)	(iii)	(i)

d)

A	B	C	D
(ii)	(iii)	(i)	(v)

21. Match the column I with column II and mark the appropriate choice

Column-I		**Column-II**	
A	Calcination	(i)	$Cr2O_3 + 2Al \rightarrow 2Cr + Al2O_3$
B	Roasting	(ii)	$FeCO_3 \longrightarrow FeO + CO_2$
C	Smelting	(iii)	$2ZnS + 3O_2 \longrightarrow ZnO + 2SO_2$
D	Aluminothermy	(iv)	$PbO + C \longrightarrow Pb + CO$

a) (A)⟶ (i), (B)⟶ (ii), (C)⟶ (iii), (D)⟶ (iv)

b) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i)

c) (A) ⟶(iii), (B) ⟶(ii), (C) ⟶(i), (D) ⟶(iv) d) (A)⟶ (ii), (B)⟶ (iii), (C)⟶ (iv), CD)⟶ (i)

22. Which of the following metals is not extracted by leaching?

a) Aluminium b) Mercury c) Silver d) Gold

23. _____being highly reactive is used in the extraction of chromium and manganese.

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

24. Which of the following ores cannot be concentrated by magnetic separation?

a) Haematite b) Malachite c) Magnetite d) Siderite

25. 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

26. 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 'CO 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.

27. Which of the following sulphides when heated strongly in air gives the corresponding metal without undergoing separate reduction of oxide?

a) Cu_2S b) FeS c) HgS d) ZnS

28. 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

29. Which of the following is not an oxide ore?
    a) Corundum b) Zincite c) Calamine d) Chromite
30. Match the column I with column II and mark the appropriate choice

Column-I		**Column-II**	
A	Calamine	(i)	Calcium
B	Barytes	(ii)	Barium
C	Cinnabar	(iii)	Zinc
D	Limestone	(iv)	Mercury

    a) (A)→ (iv), (B)→ (iii), (C)→ (i), (D)→ (ii) b) (A) → (iii), (B) → (ii), (C) → (iv), (D) → (i)
    c) (A) → (i), (B) → (iv), (C) → (ii), (D) → (iii) d) (A) → (ii), (B) → (i), (C) → (iii), (D) → (iv)
31. Which of the following compounds is used as the starting material for the preparation of potassium dichromate?
    a) $K_2SO_4.Cr_2(SO_4)_3.24H_2O$ (Chrome alum) b) $PbCrO_4$ (Chromite yellow)
    c) $FeCr_2O_4$ (Chromite) d) $PbCrO_4.PbO$ (Chrome red)
32. Which of the following is not a carbonate ore?
    a) Dolomite b) Calamine c) Siderite d) Zincite
33. "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
34. Identify the correct statement from following
    a) Pig iron can be moulded into variety of shapes
    b) Wrought iron is impure iron with 4% carbon
    c) Blister copper has blistered appearance due to evolution of CO_2.
    d) Vapour phase refining is carried out for Nickel by VanArkel method.
35. 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
36. For which of the following ores froth floatation method is used for concentration?
    a) Haematite b) Zinc blende c) Magnetite d) Carnallite
37. Which one of the following is not a sulphide ore?
    a) Galena b) Iron pyrites c) Magnetite d) Copper glance
38. Which of the following reactions is an example of autoreduction?
    a) $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$ b) $Cu_2O+C \rightarrow 2Cu+CO$
    c) $Cu^{2+}_{(aq)} + Fe_{(s)} \rightarrow Cu_{(s)} + Fe^{2+}_{(aq)}$ d) $Cu_2O + \frac{1}{2}Cu_2S \rightarrow 3Cu + \frac{1}{2}SO_2$

39. Match the column I with column II and mark the appropriate choice

Column-I		**Column-II**	
A)	Impure metal to volatile complex	(i)	Blistered copper
B)	$2CU_2O + CU_2S \rightarrow 6Cu + SO_2$	(ii)	Mond process
C)	Purification of mercury	(iii)	van Arkel process
D)	Purification of zirconium	(iv)	Liquation

a) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)
b) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)
c) (A) → (i), (B) → (ii), (C) → (iv), (D) → (iii)
d) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii)

40. Which of the following reactions is not taking place in Blast furnace during metallurgy of iron between the temperature range of 500-800 K?
a) $FeO + CO \nrightarrow Fe + CO_2$ b) $3Fe_2O_3 + CO \nrightarrow 2Fe_3O_4 + 4CO_2$
c) $Fe_3O_4 + 4CO \nrightarrow 3Fe + 4CO_2$ d) $Fe_2O_3 + CO \nrightarrow 2FeO + CO_2$

41. Fill in the blanks with the correct choice.
The undesired impurities present in the ores are called (i) . To remove the volatile impurities from the ore, the (ii) process is carried out.Flux combines with non-fusible impurities to form iii CaO acts as a (iv) flux.

a)

(i)	(ii)	(iii)	(iv)
gangue	roasting	slag	acidic

b)

(i)	(ii)	(iii)	(iv)
gangue	calcination	slag	basic

c)

(i)	(ii)	(iii)	(iv)
anode mud	leaching	matrix	acidic

d)

(i)	(ii)	(iii)	(iv)
gangue	roasting	solution	acidic

42. 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

43. 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

44. Assertion: Zone refining method is used to prodllce pure metals which are used as semiconductors.
Reason : Semiconductors are used in highly Pure form
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

45. Elemental silicon to be used as a semiconductor is purified by
a) heating under vacuum b) floatation c) zone refining d) electrolysis

46. Match the column I with column II and mark the appropriate choice.

Column-I		**Column-II**	
A	Highly electropositive metals	(i)	Carbon reduction
B	Copper	(ii)	CO reduction
C	Iron	(iii)	Self reduction
D	Zinc	(iv)	Electrolysis

a) (A) → (iv), (B) → (iii), (C) → (ii), (D) → (i) b) (A) →(iii), (B) →(ii), (C) →(i), (D) →(iv)
c) (A)→ (ii), (B)→ (i), (C)→ (iii), (D)→ (iv) d) (A) →(i), (B) →(ii), (C) →(iii), (D) →(iv)

47. Given below are the different temperature reactions and products during extraction of iron in blast furnace.

P	900K	1.	$Fe_2O_3+3C \rightarrow 2Fe+3CO$
Q	1200K	2.	$CaCO_3 \rightarrow CaO+CO_2$
R	1500K	3.	$2C+O_2 \rightarrow 2CO$
S	2000K	4.	$Fe_2O_3+3CO \rightarrow 2Fe+3CO_2$

Find the correct match
a) P-4, Q-2, R-3, S-1 b) P-4, Q-3, R-2, S-1 c) P-3, Q-4, R-1, S-2
d) P-4, Q-2, R-1, S-3

48. Which of the following statements is correct about the role of collectors added during froth floatation process?
a) Collectors enhance the non-wettability of ore particles.
b) Collectors enhance the wettability of gangue particles.
c) Collectors help in separating two sulphide ores present in the mixture
d) Collectors help ore particles to settle down below the froth

49. Which of the following slags is produced during extraction of iron?
a) $CaSiO_3$ b) $FeSiO_3$ c) $MgSiO_3$ d) $ZnSiO_3$

50. Wrought iron is manufactured from cast iron by heating it with:
a) C b) $CaCO_3$ c) Fe_2O_3 d) SiO_2

51. Sulphide ore of zinc/copper is concentrated by
a) floatation process b) electromagnetic process c) gravity separation
d) distillation.

52. Which of the following reactions takes place at higher temperature range (900 K-IS00 K) in blast furnace?
a) $3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$ b) $FeO + CO \rightarrow Fe + CO_2$
c) $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$ d) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

53. Which of the following is not correct observation based on Ellingham diagram?

a) A metal can reduce the oxide of other metal which lies above it in Ellingham diagram
b) CO is more effective than C as a reducing agent below 710°C
c)
ΔG^o of metal oxides is higher than that of CO_2 hence oxidation of metal sulphides to oxides is not favourable
d)
Need for conversion of metal sulphide to metal oxide before reduction can be explained thermodynamically.

54. Which of the following elements is present as the impurity to the maximum extent in the pig iron?
a) Carbon b) Silicon c) Phosphorus d) Manganese

55. 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.

56. 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?
$FeO + SiO_2 \rightarrow FeSiO_3$
$SiO_2 + MgO \rightarrow MgSiO_3$
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

57. Which of the following metals cannot be obtained by electrolysis
a) Cr b) Na c) Ca d) Mg

58. 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

59. The metal oxide which cannot be reduced to metal by carbon is?
a) Fe_2O_3 b) Al_2O_3 c) PbO d) ZnO

60. Which one of the following elements constitutes a major impurity in pig iron?
a) Silicon b) Oxygen c) Sulphur d) Graphite

61. 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

62. Which of the following statements are incorrect?
I. Zinc can be extracted by self-reduction.
II. A depressant prevents certain type of particles to come to the froth.
III. Copper matte contains ZnS and Cu_2S,
IV. The solidified copper obtained from reverberatory furnace has blistered appearance due to evolution of SO_2 during the extraction
a) I and II b) II and III c) I and III d) II and IV

63. 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

64. Assertion: van Arkel method is used for refining of zinc.
Reason: In this method impure metal is evaporated to obtain the pure metal as distillate.
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

65. Which of the following metals is extracted using a silica lined convertor?
a) Mg b) Al c) Cu d) Zn

66. Which of the following examples is not correctly matched?
a) Two most abundant elements - Fe, Al.
b) Two metals which occur in native state - Au, Pt
c) Two metals which can occur in combined and native state both - Zn, Fe.
d) None of these

67. Yellow coloured aqueous solution of sodium chromate changes to orange when acidified with sulphuric acid because
a) H^+ ions convert chromate ions to dichromate ions
b) H^+ ions react with sodium chromate to give sodium ions which turn solution orange
c) Cr^{3+} ions are liberated in the solution which turn the solution orange
d)
sodium hydroxide is formed during the reaction which imparts orange colour to the solution

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

$$\underset{Impure}{Ti} + 2I_2 \xrightarrow{250^oC} TiI_4 \xrightarrow{1400^oC} \underset{pure}{Ti} + 2I_2$$

a) Zone refining b) Monds process c) Cupellation d) van Arkel process

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

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

70. In the extraction of chlorine by electrolysis of brine _____

a) oxidation of Cl^- ion to chlorine gas occurs

b) reduction of Cl^- ion to chlorine gas occurs

c) for overall reaction ΔGO^o has negative value

d) a displacement reaction takes place

71. 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

72. Assertion: Sulphide ores are converted to oxides before reduction.

Reason: Oxides are easier to reduce.

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

73. For the reduction of FeO with C at the temperature corresponding to (D), which of the following statements is correct?

a) Carbon reduces FeO below the temperature at point (D).

b) ΔG^o value for overall reduction with CO is zero

c) ΔG^o value for the reaction at point (D) is positive.

d) Below point (D), for the metal exists in molten state

74. Assertion: Minerals are naturally occurring chemical substances in the earth's crust obtainable by mining.

Reason: Minerals are also known as ores.

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 Only those minerals which are viable to be used as sources of metal are known as ores.

75. Match the column I with column II and mark the appropriate choice

Column-I		Column-II	
A)	Metals used as semiconductors	(i)	Aluminium
B)	Electrolytic reduction	(ii)	Zone refining
C)	Cyanide process	(iii)	Dressing of ZnS
D)	Froth floatation process	(iv)	Extraction of Ag

a) (A)→ (i), (B)→ (iii), (C)→ (ii), (D)→ (iv) b) (A)→ (iii), (B)→ (iv), (C)→ (ii), (D)→ (i)
c) (A)→ (iv), (B)→ (ii), (C)→ (iii), (D)→ (i) d) (A)→ (ii), (B)→ (i), (C)→ (iv), (D)→ (iii)

76. 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

77. Following reactions take place during extraction of gold.
$4Au + 8CN^- + 2H_2O + O_2 \longrightarrow 4[Au(CN)_2]^- + 4OH^-$ $2[Au(CN)_2]^- + Zn \rightarrow 2Au + [Zn(CN)_4]^{2-}$
Zinc in the extraction of gold acts as a/an
a) oxidising agent b) flux c) reducing agent d) decomposing agent

78. Assertion: Roasting is a process in which the ore is heated strongly in absence of air.
Reason: Concentration of sulphide ore is done by calcination.
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

79. Considering Ellingham diagram, which of the following metals can be used to reduce alumina?
a) Mg b) Zn c) Fe d) Cu

80. The name of the metal which is extracted from the ore is given below. Mark the example which is not correct.
a) Malachite - Cu b) Calamine - Zn c) Chromite - Cr d) Dolomite - Al

81. _____ and _____ are alloys of copper
a) Brass and bronze b) Brass and alloy steel c) Copper pyrites and malachite
d) Copper glance and cuprite

82. Assertion: In electrolytic refining of metal, impur, metal is made cathode while a strip of pure metal is used as anode.
Reason: The pure metal gets deposited at anode is anode mud
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

83. When copper ore is mixed with silica, in a reverberatory furnace copper matte is produced. The copper matte contains
a) sulphides of copper (II) and iron (II) b) sulphides of copper (II) and iron (III)
c) sulphides of copper (I) and iron (II) d) sulphides of copper (I) and iron (III).

84. Arrange the oxides of manganese according to increasing acidic strength.
a) $MnO < Mn_3O_4 < Mn_2O_3 < MnO_2 < Mn_2O_7$
b) $Mn_2O_7 < MnOz < Mn_2O_3 < Mn_3O_4 < MnO$
c) $MnO_2 < Mn_2O_7 < Mn_3O_4 < Mn_2O_3 < MnO$
d) $Mn_3O_4 < Mn_2O_3 < Mn_2O_7 < MnO_2 < MnO$

85. The mineral carnallite contains _(i)_ and __(ii)_ metals_(iii)_ is purified by cupellation and _(iv)_ is purified by distillation

a)

(i)	(ii)	(iii)	(iv)
calcium	zinc	mercury	tin

b)

(i)	(ii)	(iii)	(iv)
calcium	magnesium	zinc	lead

c)

(i)	(ii)	(iii)	(iv)
potassium	calcium	copper	mercury

d)

(i)	(ii)	(iii)	(iv)
magnesium	potassium	silver	mercury

86. Match the column I with column II and mark the appropriate choice.

Column-I		**Column-II**	
A)	van Arkel method	(i)	Ni
B)	Zone refining	(ii)	Ti
C)	Mond process	(iii)	Ag
D)	Cupellation	(iv)	Ge

a) (A)→ (i), (B)→ (ii), (C)→ (iii), (D)→ (iv) b) (A)→ (iii), (B)→ (i), (C)→ (ii), (D)→ (iv)
c) (A)→ (ii), (B)→ (iv), (C)→ (i), (D) → (iii) d) (A)→ (iv), (B)→ (iii), (C)→ (i), (D)→ (ii)

87. Which of the following metal evolves hydrogen on reacting with cold dilute HNO_3?
a) Mg b) Al c) Fe d) Cu

88. Most electropositive metals are obtained from their ores by
a) autoreduction b) smelting with carbon c) electrolysis of fused salts
d) thermal decomposition

89. 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

90. Extraction of gold and silver involves leaching the metal with CN^- ion. The metal is recovered by_____
a) displacement of metal by some other metal from the complex ion
b) roasting of metal complex c) calcination followed by roasting
d) thermal decomposition of metal complex

91. Identify the alloy containing a non-metal as a constituent in it.

a) Invar b) Steel c) Bell Metal d) Bronze

92. During extraction of aluminium from bauxite,
    a) the concentration of ore is done by gravity separation method
    b) molten mixture of aluminium oxide, cryolite or fluorspar is electrolysed
    c) impure aluminium is refined by liquation
    d) molten aluminium is obtained at cathode while fluorine is liberated at anode.
93. Which of the following is a halide ore?
    a) Cassiterite b) Anglesite c) Siderite d) Carnallite
94. 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 adosrbent
    d) vapours of volatile compound can be decomposed in pure metal
95. 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
96. Chromatography is a useful method for purification of elements which are
    a) very reactive b) available in minute quantities c) present in abundance
    d) highly electropositive
97. What happens when potassium iodide reacts withacidic solution of potassium dichromate?
    a) It liberates iodine b) Potassium sulphate is formed
    c) Chromium sulphate is formed d) All the above products are formed
98. In a thermite process_____ is used as reducing agent.
    a) Zn b) Al c) Mn d) Fe
99. Which of the following pairs of metal is purified by van Arkel method?
    a) Ga and In b) Zr and Ti c) Ag and Au d) Ni and Fe
100. Mark the incorrect statement
    a) Copper is extracted by smelting in a reverberatory furnace
    b) Zinc is extracted by reduction of oxide with aluminium
    c) Aluminium is extracted by electrolysis of its oxide
    d) Iron is extracted by reduction of its oxide in blast furnace
101. Common impurities present in bauxite are

a) CuO b) ZnO c) CaO d) SiO_2

102. Which of the following statements is not correct?
a) Zinc can be extracted from its ore by roasting followed by reduction with coke
b) In reverberatory furnace, both oxidation and reduction processes can be carried out
c) Silver is purified by distillation or liquation process.
d) Highly pure metals are obtained by zone refining.

103. Which of the following is not an example of roasting?
a) $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ b) $2PbS + 3O_2 \rightarrow 2PbO + 2SO_2$
c) $2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$ d) $2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

104. 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)

105. Which of the following is not the correct name of the formula of the ore given with it?
a)

$MgSO_4 \cdot 7H_2O$	Epsom salt

b)

$CuCO_3 \cdot Cu(OH)_2$	Malachite

c)

$KAlSi_3O_8$	Feldspar

d)

$KCl \cdot MgCl_2 \cdot 6H_2O$	Dolomite

106. Carnallite on electrolysis gives
a) Mg and Cl_2 b) Ca and Cl_2 c) K and Cl_2 d) Al and Cl_2

107. Which of the following metals is obtained by electrolytic reduction process
a) Fe b) Cu c) Ag d) Al

108. A number of elements are available in earth's crust but most abundant elements are_____
a) Al and Fe b) Al and Cu c) Fe and Cu d) Cu and Ag

109. The following reactions take place in the blast furnace in the preparation of impure iron. Identify the reaction pertaining to formation of the slag:
a) $\mathrm{Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(l) + 3CO_2(g)}$
b) $\mathrm{CaCO_3(s) \rightarrow CaO(s) + CO_2(g)}$ c) $\mathrm{CaO(s) + SiO_2(s) \rightarrow CaSiO_3(s)}$
d) $\mathrm{2C(s) + O_2(g) \rightarrow 2CO(g)}$

110. 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

111. Silica is added to the sulphide ore of coppe in reverberatory furnace because
a) sulphide ore of copper contains iron as impurity which is removed as iron slag
b) silica reacts with Cu-O to form slag c) silica helps in reduction of Cu_2O to Cu

d) sulphide ore of copper is separated from iron' by reacting with silica

112. Roasting of sulphides gives the gas X as a by-product. This is a colourless gas with chocking smell of burnt sulphur and causes great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a reducing agent and its acid has never been insolated. The gas X is:
a) H_2S b) SO_2 c) CO_2 d) SO_3

113. 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 I reaction involved in the process.

114. Impure Ni+4CO$\xrightarrow{60-80^oC}$ Ni(CO_4) $\xrightarrow{180^oC}$Ni + 4CO The above process of purification of the metal is known as
a) van Arkel process b) pyrometallurgy c) Mond process d) zone refining.

115. Assertion: In froth floatation method, collectors such as pine oil or xanthates are added to the suspension of powdered ore.
Reason: Collectors stabilise the froth
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

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

117. Which of the following statements is correct according to the basic concepts of thermodynamics which govern the feasibility of a metallurgical process?
a)
When the value of i1G is positive for the equation $\Delta G = \Delta H - T\Delta S$, the reaction will proceed
b)
If reactants and products of two reactions are put together and net ΔG is -ve, the overall reaction will occur
c) On increasing the temperature, the value of ΔG becomes +ve.
d)
Feasibility of thermal oxidation of an ore can be established by Ellingham diagram in which a straight line shows the reduction reaction will proceed.

118. Froth floatation process of concentration is based on the
a) preferential wetting properties with the frothing agent and water
b) difference in the specific gravities of gangue and ore particles

c) difference in solubility of gangue and ore particles in frothing agent and water
d) difference in reactivity of gangue and ore particles with water and frothing agent

119. 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

120. Assertion: Magnesium metal is not used for the reduction of alumina in the metallurgy of aluminium.
Reason : MgO curve lies above Al_2O_3 curve in Ellingham diagram.
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

121. Extraction of chlorine from brine is based on:
a) reduction b) displacement c) oxidation d) evaporation.

122. Which of the following metals cannot be obtained by reduction of its metal oxide by aluminium?
a) Cr b) Mn c) Fe d) Mg

123. At the point of intersection of Al_2O_3 and MgO curves (A), $\triangle G^o$ becomes zero for the reaction,
$\frac{2}{3}Al_2O_3 + 2Mg \longrightarrow 2MgO + \frac{4}{3}Al$
Above this point, magnesium can reduce alumina. Although thermodynamically feasible, Mg is not used for reduction of Al_2O_3 because
a) temperature required is very hjgh b) the yield of metal is very low
c) value of, $\triangle G^O$ becomes positive
d) magnesium is not used as reducing agent for any reaction.

124. An ore of tin containing, $FeCrO_4$ is concentrated by
a) gravity separation b) magnetic separation c) froth floatation d) leaching.

125. Blister copper is
a) impure copper b) obtained in self-reduction process during bessemerisation
c) both are correct d) none is correct

126. Which of the following statements is correct?
(i) Copper is extracted by hydrometallurgy from low grade ores.
(ii) In electrolytic reduction of alumina, graphite is acting as anode and steel vessel with

lining of carbon acts as cathode.

(iii) In Hall-Heroult process, aluminium is obtained at anode and CO and CO_2 are produced at cathode.

a) (i) only b) (i) and (ii) only c) (ii) and (iii) only d) All of these

127. Acidified potassium dichromate reacts with potassium iodide and oxidises it to I_2. What is the oxidation state of chromium in the products of the reaction?

a) +4 b) +6 c) +3 d) +2

128. Assertion: Tin is refined by liquation method.

Reason: Tin has low melting point as compared to impurities.

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

129. In this method, a low melting metal like tin can be made to flow on a sloping surface. In this way it is separated from higher melting impurities. The method is known as

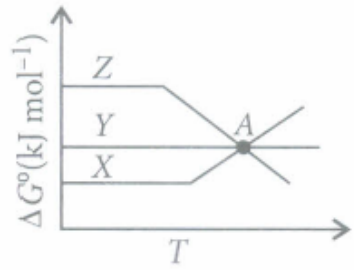
a) distillation b) vapour phase refining c) liquation d) zone refining.

130. What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid?

a) $Cr_2O_4^{2-}$ is reduced to +3 state of Cr b) $Cr_2O_4^{2-}$ is oxidised to +7 state of Cr.

c) Cr^{3+} and $Cr_2O_7^{2-}$ are formed d) $Cr_2O_7^{2-}$ and H_2O are formed

131. 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) Ywill reduce oxide of X. c) Z will reduce oxide of X.

d) Z will reduce oxide of Y

132. Assertion: Limestone added in the blast furnace decomposes to give CaO which forms slag in molten state and separates out from iron.

Reason : The iron obtained from the blast furnace contains about 4% carbon and many impurities like S, P, Si, Mn, etc.

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

133. Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of:
a) $Al_2O_3 + HF + NaAlF_4$ b) $Al_2O_3 + CaF_2 + NaAlF_4$ c) $Al_2O_3 + Na_3AlF_6 + CaF_2$
d) $Al_2O_3 + KF + Na_3AlF_6$

134. 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

135. Thereaction $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$ (ΔG^o = - 421 kJ) is thermodynamically feasible due to -ve value of tJ.G. Why does this reaction not take place at room temperature:
a)
Certain amount of activation energy is essential for thermodynamically feasible reactions also
b) Due to high melting point of chromium oxide the reaction does not take place
c) Overall value of ΔG^o for the net reaction becomes positive
d) Molecules of Cr_2O_3 and Al are not oriented properly

136. The main difference between cast iron and pig iron is
a) cast iron is purest form ofiron 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

137. The oil used as frothing agent in froth floatation process is
a) coconut oil b) castor oil c) palmitic oil d) pine oil

138. From the Ellingham graph between Gibbs energy and temperature, out of C and CO which is a better reducing agent for ZnO?
a) Carbon b) CO c) Both of these d) None of these

139. 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)

140. A solid compound X on heating gives CO_2 gas and a residue. The residue mixed with water forms Y. On passing an excess of CO_2 through Y in water, a clear solution Z is obtained. On boiling Z, compound X is reformed. The compound X is
a) $Ca(HCO_3)_2$ b) $CaCO_3$ c) $NaZCO_3$ d) K_2CO_3

141. Cassiterite is an ore of:
a) Mn b) Ni c) Sb d) Sn

142. Purification of aluminium by electrolytic refining is known as
a) Hall's process b) Baeyer's process c) Hoope's process d) Serpeck's process

143. What is the process of leaching in case of low grade copper ores?
a) Leaching is carried out with NaOH and O_2 b) Leaching is carried out with NaCN
c) Leaching is carried out with acids in presence of H_2.
d) Leaching is carried out by boiling the ore with water

144. Impurities of sulphur, silicon and phosphorus can be removed from cast iron by adding
a) carbon which reduces the impurities b) water which dissolves the impurities
c) limestone which changes impurities into oxides and pass into slag
d) iron oxide which reacts with impurities by forming slag.

145. During the extraction of haernatite, limestone is added which acts as
a) flux b) slag c) reducing agent d) gangue

146. Assertion : Nickel is purified by reacting it with CO.
Reason : Impurities present, form a volatile complex.
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

147. Pyrolusite is
a) a sulphide ore of Mn b) an oxide ore of Mn c) a carbide ore of P
d) a chloride ore of Zn

148. Which of the following reactions do not result in the preparation of potassium dichromate from chromate?
(I) $4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow$
(II) $Na_2CrO_4 + H_2SO_4 \rightarrow$
(III) $Na_2CrzO_7 + 2KCl \rightarrow$
a) (I) and (II) b) (II) and (III) c) (I) and (III) d) (I), (II) and (III)

149. 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) Liquation

150. In electro-refining of copper, some gold is deposited as
a) cathode mud b) electrolyte c) anode mud d) cathode.

151. 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) → (iii), (B) → (i), (C) → (ii), (D) → (iv)
b) (A) → (iii), (B) → (iv), (C) → (i), (D) → (ii) c) (A)→ (i), (B)→ (iii), (C)→ (ii), (D)→ (iv)
d) (A) → (iv), (B) → (i), (C) → (ii), (D) → (iii)

152. Ellingham diagram represents change:
a) ΔG with temperature b) ΔH with temperature c) ΔG with pressure
d) (ΔG - $T\Delta S$) with temperature

153. The materials which can withstand very high temperature without melting or becoming soft are called _____ These are used in making _____ of furnaces.
a) refractory materials, inner lining b) flux, base c) brick materials, outer structure
d) mica, outer lining

154. 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,
a) Zr : Zone refining, Ga : Mend's process
Ni : Monds process, Cu : Electrolysis,
b) Zr : van Arkel process, Ga : Zone refining
Ni : Monds process, Cu : van Arkel process,
c) Zr : Zone refining, Ga : Electrolysis
Ni: Electrolysis, Cu : Zone refining,
d) Zr: van Arkel process, Ga : Mend's process

155. Which of the following reactions show the process of smelting?
a) $2PbO + PbS \rightarrow 3Pb + SO_2$ b) $2Na[Au(CN)_2] + Zn \rightarrow Na2[Zn(CN)_4] + 2Au$
c) $PbO + C \rightarrow Pb + CO$ d) $2HgS + 3O_2 \rightarrow 2HgO + 2SO_2$

156. Which of the following is magnetite?
a) Fe_2CO_3 b) Fe_2O_3 c) Fe_3O_4 d) $Fe_2O_3 \cdot 3H_2O$

157. Which one of the following is a mineral of iron?
a) Malachite b) Cassiterite c) Pyrolusite d) Magnetite

158. Calcium is obtained by the
a) roasting of limestone b) electrolysis of solution of calcium chloride H_2O
c) electrolysis of molten anhydrous calcium chloride
d) reduction of calcium chloride with carbon

159. 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

160. Choose the correct option of temperature at which carbon reduces FeO to iron and produces CO.

a) Below temperature at point A
b) Approximately at the temperature corresponding to point A
c) Above temperature at point A but below temperature at point D
d) Above temperature at point A

161. In which of the following the name of the ore is not matched with its formula?
a) Cassiterite - SnO_2 b) Limonite - $Fe_2O_3 \cdot 3H_2O$ c) Siderite - $FeCO_3$
d) Anglesite - $PbCO_3$

162. 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

163. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with_____
a) FeS b) CO c) Cu_2S d) SO_2

164. 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

165. Find the incorrect match.

a)		b)		c)		d)	
Kaolinite	$[Al_2(OH)_4Si_2O_5]$	Siderite	Fe_2O_3	Sphalerite	ZnS	Magnetite	Fe_3O_4

166. Which of the following reactions does not take place during leaching for concentration of bauxite?
a) $Al_2O_3 + 2NaOH + 3H^2O \longrightarrow 2Na[Al(OH)_4]$
b) $Al_2O_3 + 2NaOH + 3H^2O \longrightarrow 2Na[Al(OH)_4]$ c) $Al_2O_3 \cdot 2H_2O \xrightarrow{\triangle} Al_2O_3 + 2H_2O$
d) $Al_2O_3 \cdot xH_2O \xrightarrow{\triangle} Al_2O_3 + xH_2O$

167. The reaction of H_2O_2 with hydrogen sulphide is an example of reaction:
a) addition b) oxidation c) reduction d) acidic