# Self Practice Paper (SPP)

1.	The rocky and silicious (1) slag	matter associated with a (2) mineral	n ore is called : (3) matrix or gangue	(4) flux					
2.	The process of removin (1) levigation	g lighter gangue particle: (2) liquation	s by washing in a current (3) leaching	t of water is called : (4) cupellation.					
3.	Gravity separation meth (1) preferential washing (2) difference in densitie (3) difference in chemic (4) none of these.	nod is based upon : of ores and gangue parters of ore particles and im al properties of ore partic	irticles. mpurities. ticles and impurities.						
4.	In the froth floatation pr (1) they are light. (3) their surface is prefe	ocess for the purification erentially wetted by oil.	of minerals the particles float because : (2) they are insoluble. (4) they bear an electrostatic charge.						
5.	An ore of tin containing (1) magnetic separation	$FeCr_2O_4$ is concentrated (2) froth floatation	by : (3) leaching method	(4) gravity separation.					
6.	Process of heating ore (1) calcination	in air to remove sulphur i (2) roasting	s : (3) smelting	(4) none of these.					
7.	In roasting : (1) moisture is removed (3) ore becomes porous	l. S.	<ul><li>(2) non–metals as their volatile oxide are removed.</li><li>(4) all the above.</li></ul>						
8.	Roasting is carried out i (1) galena	in case of : (2) iron pyrites	(3) copper glance (4) all.						
9.	<ul><li>Slag is a product of :</li><li>(1) flux and coke.</li><li>(3) flux and impurities.</li></ul>		(2) coke and metal oxide. (4) metal and flux.						
10.	An ore after levigation during smelting ?	is found to have basic	impurities. Which of the	following can be used as flux					
	(1) $H_2 SO_4$	(2) CaCO <sub>3</sub>	(3) SiO <sub>2</sub>	(4) Both CaO and $SiO_2$ .					
11.	Among the following statements, the incorrect one is :(1) calamine and siderite are carbonates(2) argentite and cuprite are oxides(3) zinc blende and iron pyrites are sulphides(4) malachite and azurite are ores of copper								
12.	Electrolytic reduction m (1) highly electronegativ (3) transition metals.	ethod is used in the extra /e elements.	action of : (2) highly electropositive elements. (4) noble metals.						
13.	Which one of the follow (1) Pb	ing metals cannot be ext (2) Fe	racted by carbon reduction (3) Zn	tion ? (4) Al.					
14.	Among the following g respective metals.	proups of oxides, the g	roup that cannot be re	educed by carbon to give the					
	(1, 22, 22, 21, 21, 22)	$(-, \cdot, \cdot,$	(-,,2	(.,,					

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15.	The process of bringing the metal or its ore into solution by the action of a suitable chemical reage followed by extraction of the metal either by electrolysis or by a suitable precipitating agent i.e. more electropositive metal is called :											cal reagent nt i.e. more		
	(1) eleo	ctrometa	llurgy	(2) hy	drometall	urgy	(3) ele	ctro-refi	ning	(4) z	one refining.			
16.	Cryolite (1) Na <sub>3</sub> (2) Na <sub>3</sub> (3) Na (4) Na conduc	e is : AIF <sub>6</sub> and AIF <sub>6</sub> and AIF <sub>6</sub> and AIF <sub>6</sub> and AIF <sub>6</sub> and	l is useo l is useo d is use d is use	l in the l in the d in the ed in the	electrolys electrolys electrolyt e electro	is of alu is of alu ic purific lysis of	alumina for decreasing electrical conductivity. alumina for lowering the melting point of alumina. rification of alumina. of alumina for increasing the melting point and electrica							
17.	In the 6 (1) 2Cu (3) 2Cu	extraction $u_2O + Cuu_2S + 3O$	n of Cu $I_2 S \rightarrow 60$ $I_2 \rightarrow 2C R$	the read Cu + S0 u <sub>2</sub> O + 2	ction take D <sub>2</sub> . SO <sub>2</sub> .	s place i	blace in Bessemer converter is : (2) $2CuFeS_2 + O_2 \rightarrow Cu_2S + FeS + SO_2$ . (4) $2FeS + 3O_2 \rightarrow 2FeO + 2SO_2$ .							
18.	<ul> <li>Which of the following statement is incorrect about the extractive metallurgy of copper ?</li> <li>(1) Matte chiefly consists of iron sulphide and some ferrous oxide.</li> <li>(2) The impurity of iron sulphide is removed as fusible slag, FeSiO<sub>3</sub> during roasting.</li> <li>(3) The copper pyrite is concentrated by froth floatation process.</li> <li>(4) Copper is obtained by self reduction in bessemer converter.</li> </ul>													
19.	Van Ar (1) vola (3) nor	kel meth atile stab i-volatile	nod of po le comp stable o	urificatio ound. compou	on of meta nd.	als involv	volves converting the metal to : (2) volatile unstable compound. (4) none of these.							
20.	Copper and tin are refined by : (1) liquation    (2) cupellation						(3) bes	ssemeris	sation	(4) poling.				
21.	The pro (1) silic	ocess of con	zone re	fining is (2) ge	s used for rmanium	:	(3) gal	lium		(4) all the above.				
22.	Tin and (1) cup	d zinc ca ellation	n be ref	ined by (2) liq		(3) pol	ing		(4) bessemerisation.					
23.	Which one of the following reactions is a (1) 2 Ag + 2HCl + [O] $\rightarrow$ 2 AgCl + H <sub>2</sub> O (3) 2 ZpS + 3O $\rightarrow$ 2 ZpO + 2 SO						an example of calcination process ? (2) 2 Zn + $O_2 \rightarrow 2$ ZnO. (4) MaCO <sub>2</sub> $\rightarrow$ MaO + CO <sub>2</sub> .							
24.	Match	column	∠ with co	olumn II	and sele	ct the co	orrect ar	swer us	ing the g	codes	aiven below the	e lists ·		
	Column I										given belen un			
	I. Cyar	hide proc	ess. ion proc	229		(a) Ultr	(a) Ultra pure Ge (b) Pine oil.							
	III. Ele	ctrolytic	reductio	on.		(c) Extraction of Al.								
	IV. Zo	ne refinir	ng. TTT (d)	Т <u>И</u> (Б)		(d) Extraction of Au. (a) $L(d) = H(d) = H(d)$								
	(1) I–(0 (3) I–(0	c), II–(a) c), II–(b)	, III–(d) , III–(d)	, IV-(b) , IV-(a)		(2) $I^{-}(0)$ , $II^{-}(0)$ , $II^{-}(0)$ , $IV^{-}(a)$ (4) $I^{-}(d)$ , $II^{-}(a)$ , $III^{-}(c)$ , $IV^{-}(b)$								
25.	Match alterna	the ore: te.	s listed	in colu	mn I witl	h the ty	pe of o	ores liste	ed in co	lumn 🛛	II and select t	he correct.		
		Colum	n I			Column II								
	(a) (b)	Limoni Argent	te. ite.				Carbo Halide	nate ore ore.						
	(c)	Carnal	lite				(r) Sulphide ore.							
	(a)	(a)	ne. (b)	(c)	(d)		(S)	(a)	ore. (b)	(c)	(d)			
	(1)	(s)	(r)	(q)	(p)		(2)	(p)	(s)	(q)	(r)			

	(3)	(p)	(q)	(r)	(s)	(4)	(s)	(r)	(p)	(q)				
26.	Match t	the meth	hod of c	concentra	ation of the ore	in colur	nn I wit	h the or	e in co	lumn II :	and s	select	the	
	0011001	Colum	n I				Colum	n II						
	(a)	Leachir	na.			(g)	Copper	pvrite.						
	(b)	Calcina	tion.			(q)	Siderite.							
	(c)	Froth flo	oatation.			(r)	Bauxite							
	(d)	Magnet	tic separ	ation.		(s)	Chromite.							
		(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)				
	(1)	(s)	(q)	(p)	(r)	(2)	(r)	(q)	(p)	(s)				
	(3)	(p)	(q)	(r)	(s)	(4)	(q)	(r)	(p)	(s).				
27.	Match t	he extra	action pr	ocess lis	sted in column I	with me	etals liste	ed in col	umn II a	and choo	ose th	ne cor	rect	
	option.		-											
		Colum	n I				Colum	n II						
	(a)	Self red	luction.				(p)	Copper	from co					
	(b)	Carbon	and car	bon mor	noxide reduction.		(q)	Silver fr	om arge	entite.				
	(c)	Electrol	lytic redu	uction in	fused state.		(r)	Aluminium from bauxite.						
	(d)	Comple	ex forma	/ metal.	(s)	Iron from	atite.							
		(a)	(b)	(c)	(D)	(2)	(a)	(b)	(c)	(D)				
	(1)	(p)	(S)	(r)	(q)	(2)	(p)	(r)	(S)	(q) (a)				
	(3)	(S)	(p)	(r)	(q)	(4)	(p)	(r)	(S)	(q)				
28.	The iron obtained from the blast furnace is called :													
	(1) pig i	ron		(2) cast	iron	(3) wro	ught iron (4) steel							
29.	The extraction of zinc from zinc blende involves :													
	(1) the electrolytic reduction.													
	(2) the	(2) the roasting followed by reduction with carbon.												
	(3) the	3) the calcination followed by reduction with another metal.												
	(4) the	(4) the roasting at molten temperature.												
30.	Carbon cannot be used in the reduction of Al <sub>2</sub> O <sub>3</sub> because :													
	(1) it is non-metal													
	(2) the heat of formation of $CO_2$ is more than that of $AI_2O_3$													
	(3) pure carbon is not easily available													
	(4) the	(4) the heat of formation of $Al_2O_3$ is too high												
31.	The metal that occurs in the native state as well as in the combined form is :													
	(1) silve	er		(2) mag	Inesium	(3) alun	ninium		(4) mar	nganese				
32.	Elemen	it found i	in the se	diments	in the ocean floo	or is :								
	(1) iron			(2) mag	Inesium	(3) gold	l		(4) iodi	ne				

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- 33. In metallurgical processes the flux used for removing acidic impurities is :
  - (2) sodium chloride (3) lime stone (1) silica

(4) sodium carbonate.

The following flow diagram represents the extraction of magnesium from sea water. 34. Sea water  $\xrightarrow{(p)}$  Mg(OH)<sub>2</sub>  $\xrightarrow{(q)}$  MgCl<sub>2</sub> + H<sub>2</sub>O

crystallisation

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- **45.** Which process of reduction of mineral to the metal is suited for the extraction of copper from its ores with low copper content?
  - (1) Metal displacement
  - (3) Chemical reduction

- (2) Auto reduction
- (4) Electrolytic reduction

	SPP Answers													
1.	(3)	2.	(1)	3.	(2)	4.	(3)	5.	(1)	6.	(2)	7.	(4)	
8.	(4)	9.	(3)	10.	(3)	11.	(2)	12.	(2)	13.	(4)	14.	(3)	
15.	(2)	16.	(2)	17.	(1)	18.	(1)	19.	(2)	20.	(4)	21.	(4)	
22.	(2)	23.	(4)	24.	(2)	25.	(1)	26.	(2)	27.	(1)	28.	(1)	
29.	(2)	30.	(4)	31.	(1)	32.	(3)	33.	(3)	34.	(3)	35.	(4)	
36.	(3)	37.	(2)	38.	(1)	39.	(2)	40.	(2)	41.	(1)	42.	(2)	
43.	(2)	44.	<b>(</b> 3)	45.	(3)									

# **SPP Solutions**

- **1.** The rocky and silicious impurities associated with an ore is called matrix or gangue.
- 2. Lighter gangue particles are washed in a current of water by a process called levigation. In levigation the powdered ore is agitated with water or washed with a upward stream of running water, the lighter particles of sand, clay etc are washed away leaving behind heavier ore particles.
- **3.** Hydraulic washing or Gravity separation or Levigation method is based on the difference in the densities of the gangue and ore particles.
- 4. This method is commonly used for the concentration of the low grade sulphide ores like galena, PbS (ore of Pb); copper pyrites  $CuFeS_2$  (ore of copper); zinc blende, ZnS (ore of zinc) etc., and is based on the fact that gangue and ore particles have different degree of wettability with water and pine oil; the gangue particles are preferentially wetted by water while the ore particles are wetted by oil.
- **5.** An ore of tin containing  $FeCr_2O_4$  is concentrated by magnetic separation as  $FeCr_2O_4$  is ferromagnetic.
- 6. Roasting is a process of heating the concentrated ore (generally sulphide ore) strongly in the excess of air or  $O_2$  below its melting point. During roasting impurities of As, Sb, P and S escape as their volatile oxides.

 $S(s) + O_2(g) \longrightarrow SO_2(g)$ 

**7.** Roasting removes easily oxidisable volatile impurities like arsenic (as  $As_2O_3$ ) sulphur (as  $SO_2$ ), phosphorus (as  $P_4O_{10}$ ) and antimony (as  $Sb_2O_3$ ).

4M (M = As, Sb) +  $3O_2 \longrightarrow 2M_2O_3^{\uparrow}$ S +  $O_2 \longrightarrow SO_2^{\uparrow}$ ;  $P_4 + 4O_2 \longrightarrow P_4O_{10}^{\uparrow}$ 

Organic matter, moisture if present in the ore, also get expelled and the ore becomes porous.

- **8.** Generally the sulphides of Zn, Pb, Fe, Cu etc. are subjected to roasting to convert in to their oxides prior to reduction by carbon.
- **9.** In many extraction processes, an oxide is added deliberately to combine with other impurities and form a stable molten phase immiscible with molten metal called a slag. The principle of slag formation is essentially the following.

Nonmetal oxide (acidic oxide) + Metal oxide (basic oxide) — Fusible (easily melted) slag.

**10.** Acidic flux is used. It is an acidic oxide (oxide of a non-metal) like SiO<sub>2</sub>, P<sub>2</sub>O<sub>5</sub>, B<sub>2</sub>O<sub>3</sub> (from borax). It is used to remove the basic impurity like CaO, FeO, MgO etc. The acidic flux combines with the basic impurity and forms a slag.

- **11.** (1) Calamine is  $ZnCO_3$  and siderite is  $FeCO_3$ 
  - (2) Argentite is  $Ag_2S$  while cuprite is  $Cu_2O$
  - (3) Zinc blende is ZnS and iron pyrites is  $FeS_2$
  - (4) Malachite is CuCO<sub>3</sub> Cu(OH)<sub>2</sub> and azurite is 2CuCO<sub>3</sub> Cu(OH)<sub>2</sub>
- **12.** Electrolytic reduction method is used in the extraction of highly electropositive elements as they themselves are stronger reducing agents. They lie above hydrogen in electrochemical series.
- **13.** Electrolytic reduction method is used in the extraction of highly electropositive elements as they themselves are stronger reducing agents. They lie above hydrogen in electrochemical series. The heat of formation of  $AI_2O_3$  is very high and therefore, at higher temperature there will be the possibility of formation of  $AI_2C_3$  with carbon.
- **14.** (1)  $Cu_2O + C \xrightarrow{\Delta} 2Cu + CO$ ;  $SnO_2 + 2C$  (anthracite)  $\xrightarrow{1800^{\circ}C} Sn + 2CO$ .

(2)  $2Fe_2O_3 + 3C \longrightarrow 4Fe$  (spongy iron) +  $3CO_2$ ; ZnO + C  $\xrightarrow{1200^{\circ}C}$  Zn + CO.

(3) Oxides of highly reactive metals (like  $K_2O$ ) are not reduced by carbon. K lie above hydrogen in electrochemical series and so it acts as strong reducing agent. K is obtained by electrolytic reduction of their fused salts.

(4) FeO + C  $\longrightarrow$  Fe + CO ; PbO + C  $\longrightarrow$  Pb + CO

- **15.** A hydrometallurgical process for the extraction of metals from ores, concentrates, or secondary materials essentially contains three basic steps—dissolution of the valuable metal in the aqueous solution (leaching) purification of leach solution and subsequent recovery of metal from the purified solutions either by electrolysis or by adding some electropositive metal to it.
- **16.** Cryolite is Na<sub>3</sub>AlF<sub>6</sub> and is used in the electrolysis of alumina. It reduces the melting point of alumina and increase the electrical conductivity of electrolyte.



- **18.** In actual process the ore is heated in a reverberatory furnace after mixing with silica. In the furnace, iron oxide 'slags off' as iron silicate and copper is produced in the form of copper matte which contains mostly Cu<sub>2</sub>S and some FeS.
- **19.** Ti (impure) +  $2I_2$  (g)  $\xrightarrow{50-250^{\circ}C}$  Ti $I_4$  (g)  $\xrightarrow{1400^{\circ}C}$  Ti (pure) +  $2I_2$  (g)
- **20.** This process is used for the purification of copper and tin to remove the impurities of their oxides. Green wood  $\rightarrow$  Hydrocarbons  $\rightarrow$  CH<sub>4</sub>; 4CuO + CH<sub>4</sub>  $\rightarrow$  4Cu (pure metal) + CO<sub>2</sub> + 2H<sub>2</sub>O Green wood  $\rightarrow$  Hydrocarbon  $\rightarrow$  CH<sub>4</sub>; 2SnO<sub>2</sub> + CH<sub>4</sub>  $\rightarrow$  2Sn + CO<sub>2</sub> + 2H<sub>2</sub>O

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- 21. This process is used when metals are required in very high purity, for specific application. For example pure Si and Ge are used in semiconductors and hence are purified by this method. Zone refining method is based on the principle that an impure molten metal on gradual cooling will deposit crystals of the pure metal, while the impurities will be left in the remaining part of the molten metal.
- **22.** This process is used for the purification of the metal, which itself is readily fusible, but the impurities present in it are not, i.e., the impurities are infusible. This process is used for the purification of Sn and Zn, and for removing Pb from Zn-Ag alloy, which is obtained at the end of Parke's process and contains Pb as impurity.
- **23.** Conversion of a carbonate into oxide is an example of calcination

$$\mathsf{MgCO}_3 \xrightarrow[\text{absence of air}]{} \mathsf{MgO} + \mathsf{CO}_2^{\uparrow}.$$

24.

(I)  $4Au / Ag (s) + 8CN^{-}(aq) + 2H_2O(aq) + O_2(g) \longrightarrow 4[Au / Ag (CN)_2]^{-}(aq) + 4OH^{-}(aq)$ 

$$2[Au / Ag (CN)_2]^-(aq) + Zn(s) \longrightarrow 2Au / Ag (s) + [Zn(CN)_4]^{2-} (aq)^{-1}$$

(II) This method is based on the fact that gangue and ore particles have different degree of wettability with water and pine oil; the gangue particles are preferentially wetted by water while the ore particles are wetted by oil.

(III) Electrolytic reduction (Hall-Heroult process) :

The purified  $Al_2O_3$  is mixed with  $Na_3AlF_6$  (cryolite) or  $CaF_2$  (fluorspar) ) which lowers the melting point of the mixture and increases conductivity. The fused matrix is electrolysed. The electrolytic reactions are :

**(IV)** This process is used when metals are required in very high purity, for specific application. For example pure Si and Ge are used in semiconductors and hence are purified by this method. Zone refining method is based on the principle that an impure molten metal on gradual cooling will deposit crystals of the pure metal, while the impurities will be left in the remaining part of the molten metal.

- **25.** (a) Limonite is  $Fe_2O_3$ .  $3H_2O$ . (b) Argentite is  $Ag_2S$ . (c) Carnallite is KCI.MgCl<sub>2</sub>.6H<sub>2</sub>O. (d) Calamine is ZnCO<sub>2</sub>.
- **26.** (a) Bauxite is leached with NaOH (concentrated) to form soluble Na[Al(OH)<sub>4</sub>] complex and insoluble impurities are filtered off.

(b) Carbonate and hydroxide ores are heated in absence of air below their melting point to convert in to their oxides in reverberatory furnace. This is called calcination. So siderite,  $FeCO_3$  is subjected to calcination.

(c) This method is commonly used for the concentration of the low grade sulphide ores like galena, PbS (ore of Pb); copper pyrites  $CuFeS_2$  (ore of copper); zinc blende, ZnS (ore of zinc) etc., and is based on the fact that gangue and ore particles have dlfferent degree of wettability with water and pine oil; the gangue particles are preferentially wetted by water while the ore particles are wetted by oil.

(d) Chromite ore  $(FeO.Cr_2O_3)$  having magnetic properties is separated from non-magnetic silicious impurities by magnetic separator.

#### 27. (a) Self-reduction method

This method is also called auto-reduction method or air reduction method. If the sulphide ore of some of the less electropositive metals like Hg, Cu, Pb etc. are heated in air, a part of these is changed into oxide or sulphate that then reacts with the remaining part of the sulphide ore to give its metal and  $SO_2$ .

$$Cu_{2}S + 3O_{2} \longrightarrow 3Cu_{2}O + 2SO_{2}$$
$$2Cu_{2}O + Cu_{2}S \longrightarrow 6Cu + SO_{2}$$

(b) **Reduction with carbon / carbon monoxide :** 

 $2Fe_2O_3 + 3C \longrightarrow 4Fe \text{ (spongy iron)} + 3CO_2$   $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$  $Fe_3O_4 + 4CO \longrightarrow 3Fe + CO_2$ 

#### (c) Electrolytic reduction (Hall-Heroult process) :

The purified  $AI_2O_3$  is mixed with  $Na_3AIF_6$  (cryolite) or  $CaF_2$  (fluorspar) ) which lowers the melting point of the mixture and increases conductivity. The fused matrix is electrolysed.

The electolysis of the molten mass is carried out in an electrolytic cell using carbon electrodes. The oxygen liberated at anode reacts with the carbon of anode producing CO and  $CO_2$ .

Cathode :  $Al^{3+}$  (melt) +  $3e^- \longrightarrow Al(l)$ Anode :  $C(s) + O^{2-}$  (melt)  $\longrightarrow CO(g) + 2e^ C(s) + 2O^{2-}$  (melt)  $\longrightarrow CO_2(g) + 4e^-$ 

#### (d) Complex formation and displacement by metal :

Extraction of Ag and Au. Metals like Au and Ag can be precipitated for their salt solution by electropositive metals for example, Zn.

Metallic Ag is dissolved from its ore in dilute NaCN solution, and the solute so obtained is treated with scrap Zn when Ag is precipitated. Air is blown into the solution oxidize Na<sub>2</sub>S. Leaching the

metals like silver, gold with CN<sup>-</sup> is an oxidation reaction (Ag  $\rightarrow$  Ag<sup>+</sup> or Au  $\rightarrow$  Au<sup>+</sup>) Ag<sub>2</sub>S (s) + 4CN<sup>-</sup> (aq)  $\longrightarrow$  2 [Ag(CN)<sub>2</sub>]<sup>-</sup> (aq) + S<sup>2-</sup> (aq) 2Ag(CN)<sub>2</sub><sup>-</sup> (aq) + Zn (s)  $\longrightarrow$  [Zn (Cn)<sub>4</sub>]<sup>2-</sup> (aq) + 2Ag (s) Here Zn acts as reducing agent.

- **28.** Molten iron from blast furnace is taken in to sand pigs for solidification. Therefore iron obtained from blast furnace is called pig iron.
- **29.**  $2ZnS + 3O_2 \xrightarrow{\text{roasting}} 2ZnO + 2SO_2$  $ZnO + C \xrightarrow{1100^{\circ}C} Zn + CO.$ Therefore, (B) option is correct.
- **30.** In Ellingham diagram, the  $\Delta_f G^0$  of  $Al_2O_3$  lies below that of  $CO_2$ . If reduction is carried out at very high temperature, the AI produced will react with carbon forming  $Al_4C_3$ .
- **31.** Silver occurs as free metal associated with rock / sand and as minerals (Ag<sub>2</sub>S, AgCl, etc.,) on earth crust. Hence it is found as native ore as well as in the combined form.
- **32.** Gold is found in the sediments found at floor of the ocean.
- **33.** Basic flux is used. It is a basic oxide (i.e., oxide of a metal) like CaO (obtained from lime stone,CaCO<sub>3</sub>), MgO (from magnesite, MgCO<sub>3</sub>), haematite (Fe<sub>2</sub>O<sub>3</sub>) etc. It is used to remove the acidic impurity like SiO<sub>2</sub>,  $P_2O_5$  etc. The basic flux combines with the acidic impurity and forms a slag.

34. 
$$\operatorname{MgCl}_{2} + \operatorname{Ca}(\operatorname{OH})_{2}(p) \rightarrow \operatorname{Mg}(\operatorname{OH})_{2} \downarrow + \operatorname{HCl}(q) \rightarrow \operatorname{MgCl}_{2} + \operatorname{H}_{2}\operatorname{O} \xrightarrow{\operatorname{crystallisation}} \operatorname{MgCl}_{2} \cdot \operatorname{6H}_{2}\operatorname{O}(r)$$
  
Heating in presence of dry  
HCI to avoid its hydrolysis  
by water of crystallisation to MgO.(s)  
Mg  $\leftarrow$   
Electrolytic reduction in molten  
state. In aqueous solution  
Mg obtained will react with  
water to form Mg(OH)\_{2}. (t)  
35.  $\operatorname{Ag}_{2}S$  (conc. ore) + 2NaCN  $\leftarrow$   
 $\xrightarrow{\operatorname{Air}}$  2AgCN + Na<sub>2</sub>S.

 $Ag_2S$  and AgCN are in equilibrium so  $Na_2S$  is oxidised by air in to  $Na_2SO_4$ . Hence equilibrium shifts towards right side.

 $4Na_2S + 5O_2 + 2H_2O \longrightarrow 2Na_2SO_4 + 4NaOH + 2S$ 

AgCN + NaCN  $\longrightarrow$  Na[Ag(CN)<sub>2</sub>] (soluble complex) 2Na[Ag(CN)<sub>2</sub>] + Zn (dust)  $\longrightarrow$  2Ag  $\downarrow$  + Na<sub>2</sub>[Zn(CN)<sub>4</sub>].