2 ELECTROCHEMICAL SERIES

Li ले	Al अली	Ni नीचे	Hg होगं
K के	Mn महान	Sn सुनो	Br ब्रह्मानंद
Ba बारह	Zn जान	Pb प्रभात	Pt पंडित
Sr सरदार	Cr कर	H है	O और
Ca का	Fe फैंके	Cu कौन	Cl कलावती
Na नाम	Cd CD	I आइये	Au सोना लायी
Mg मांगे	Co कोई	Ag आगे	F फ्री में

3 AMPHOTERIC OXIDES

ZnO, Al_2O_3, BeO, Cr_2O_3, Ga_2O_3, PbO, SnO

जनाबे अली ने बेकार गाया पंजाबी सौंग

4 ACID RADICALS

DILUTE ACID GROUP

HCO_3^-, CO_3^{-2},	CH_3COO^-,	NO_2^-,	$S_2O_3^{-2}$	SO_3^{-2}	S^{-2}
C	A	N	T	HSO_3^-,	success
			.	Sure	

CONCENTRATED ACID GROUP :

Cl^-	Br^-	I^-	NO_3^-	$C_2O_4^{-2}$,	BO_3^{-3},	F^-
C	B	I	ने 8	Ox	ब्राजील फ्रांस से	पकड़े

SPECIAL GROUP :

ASO_3^{3-}	SO_4^{2-}	MnO_4^-
ASO_4^{3-}	PO_4^{3-}	CrO_4^{2-}, $Cr_2O_7^{2-}$

9 n' FACTOR OF $KMnO_4$ IN DIFFERENT MEDIUMS

B (Basic)	A (Acidic)	N (Neutral)
1	5	3

10 GROUPS OF BASIC RADICALS & REAGENTS

Groups	Radicals
Zero	NH_4^+
I	Ag^+ Hg_2^{+2} Pb^{+2}
	आज होगा प्रभात
IIA	Hg^{+2} Pb^{+2} Cu^{+2} Cd^{+2} Bi^{+3}
	होंगे पंजाब के कुत्ते कोढ़ी बीमार
II B	As^{+3} Sb^{+3} Sn^{+2} Sn^{+4}
	आज सब सन्नाटा ही सन्नाटा
III	Fe^{+3} Cr^{+3} Al^{+3}
	फेंक कर आलू
IV	Mn^{+2} Co^{+2} Zn^{+2} Ni^{+2}
	मन को जाना नहीं
V	Ba^{+2} Sr^{+2} Ca^{+2}
	बाटा शू कम्पनी
VI	Na^+, K^+, Mg^{+2}
	नाकमाँगो

Sulphides of IIA is not soluble in yellow ammonium sulphide (Y.A.S.) where as sulphides of II B is soluble in Y.A.S.

A not S B S

ऐश्वर्या नहीं सुधा चाहिये बिना सलमान को

Learning Technique Card 4

1 BASES STRONGER THAN OH⁻ ION

H^-	Hydride	H
O^{-2}	Oxide	O
O_2^{-2}	Peroxide	Pe
O_2^-	Super Oxide	SO
N^{-3}	Nitride	News
P^{-3}	Phosphide	Paper
As^{-3}	Aresnide	Aaj
Sb^{-3}	Stebenide	Sub
Bi^{-3}	Bismuthide	Bikega
NH^{-2}	Imide	India &
NH_2^-	Amide	America mein

12 TO REMEMBER

1. $Na_3[Ag(S_2O_3)_2]$ — 3 1 2 — complex.
2. $Na_4[Cu_6(S_2O_3)_5]$ — 4 6 5 — complex
3. $Na_3[Bi(S_2O_3)_3]$ — 3 1 3 — complex
4. $Na_3[Ag(S_2O_3)_2]$ — 3 1 2 — complex

13 Pb^{2+} Zn^{2+} Cu^{2+} Mg^{2+}

पंडित जानकीदास कुत्ता माँगे

The soluble salts of Pb^{2+} Zn^{2+} Cu^{2+} Mg^{2+}. When they reacts with sodium carbonante solution they forms basic metal carbonates.

Learning Technique Card 2

5 EXCEPTIONS OF CHROMYL CHLORIDE TEST

Ag^+	Cu_2^{+2}	Hg_2^{+2}	Sn^{+4}	Pb^{+4}
आज	क्यों	होगा	सुनहरा	फल

6 DIFFERENCE BETWEEN IIA & IIB

ऐश्वर्या नहीं सुधार पायी बिगड़े सलमान को

Sulphides of **IIA Not Soluble** **IIB Soluble** in yellow ammonium sulphide

7 REACTIONS OF METALS WITH HNO_3

Following metal become passive with nitric acid

Fe	**Co**	**Ni**	**Cr**	**Al**
फे	को	नहीं	करारे	आलू

Following metal will give NH_4NO_3 on reaction with dilute & very dilute nitric acid

Zn	**Sn**	**Mg**	**Fe**	**Mn**
जन	संघ	मांगे	फे	मिना

Following metal will give H_2 on reaction with conc. Nitric acid

Mn	**Mg**
मन	माँगे

8 ALUM

$M = NH_4^+$	Na^+	K^+	Rb^+	Cs^+	
अमीना	कब		से	बोली	
$M' = Fe^{+3}$	Al^{+3}	Co^{+3}	Ga^{+3}	Cr^{+3}	Mn^{+3}
फिलहाल कोई	गा		कर	मनाये	

To avoid the confusion in name of $HgCl_2$(corrosive sublimate) and Hg_2Cl_2(calomel):

नाम(Chemical name) बड़े तो दर्शन (Chemical formula)छोटे

	अमीना	कब्र	से				
M =	NH_4^+	Na^+	K^+	Rb^+	Cs^+		बोली
	फिलहाल	कोई	गा	कर	मनाए		
M' =	Fe^{+3}	Al^{+3}	Co^{+3}	Ga^{+3}	Cr^{+3}	Mn^{+3}	•

KCN TEST FOR COBALT AND NICKEL

for **Co** **and** **Ni**

BUTLER'S BEARD YELLOW GREEN YELLOW

BUFF BROWN

Metal	Occurence
Lithium	Spodumene $LiAlSi_2O_6$, Lepidolite $(Li, Na, K)_2 Al_2(SiO_3)_3.F(OH)$
Sodium	rock salt, NaCl feld spar Na_3AlSiO_8
Magnesium	Carnalite $KCl.MgCl_2.6H_2O$ magnesite $MgCO_3$
Calcium	Lime stone $CaCO_3$ Dolomite $MgCO_3.CaCO_3$ Gypsum, $CaSO_4.2H_2O$
Copper	Copper pyrite $CuFeS_2$ Cuprite, Cu_2O Melachite, $CuCO_3.Cu(OH)_2$
Aluminium	Bauxite $Al_2O_3.2H_2O$ cryolite Na_3AlF_6 Alumino silicates
Zinc	Zinc blende or spharelite ZnS Calamine, $ZnCO_3$
Lead	Galena PbS
Tin	Cassetarite SnO_2
Silver	Argentite Ag_2S Hornsilver, AgCl
Gold	Native, small amount in mangnese ores such as those of Cu & Ag
Chromium	Chromite $Cr_2O_3.FeO$

Learning Technique Card 8

Extraction method	Remark
Electrolysis of fused LiCl/KCl	Because of their high reactivity they are expected under anhydrous condition.
Electrolysis of fused NaCl(or) $NaCl/CaCl_2$	
Electrolysis of rusted MgO (or) $MgCl_2/KCl$ Carbon reduction of MgO	Carbon reduction is not possible with alkaline earths as a carbide is formed with them.
Electrolysis of fused $CaCl_2/CaF_2$	
Roasting of sulphide partially and reduction $2Cu_2O+Cu_2S \rightarrow 6Cu+SO_2$	It is self reduction in a specially derived converter. H_2SO_4 leaching is also employed.
Electrolysis of Al_2O_3 dissolved in molten cryolite (or) in Na_3AlF_6	A good source of electricity is needed in the extraction of Al.
Roasting & then reduction with 'C'	Metal may be purified by fraction distillation.
Roasting of sulphide ore and then reduction of the oxide. Carbon reduction of the oxide	
Carbon reduction of the oxide	Magnetic separated is employed as the impurities in this case are magnetic.
Sodium cyanide leaching of the sulphide ore & finally replacement of Ag by Zn.	
Cyanide leach same as in case of silver	
Si (or) Al reduction of the oxide (Alumino-thermite process)	

Learning Technique Card 6

TEST OF Co^{2+}

$CoO + ZnO \longrightarrow CoO.ZnO$

Rinmann 's green

$CoO + MgO \longrightarrow CoO.MgO$

Cobalt Pink

$CoO + Al_2O_3 \longrightarrow CoO.Al_2O_3$

Thenard Blue

$CoO + SnO \longrightarrow CoO.SnO$

Cobalt Green

Learning Technique Card 9

AAROHAN

1. $O^{2+} > F^- > Na^+ > Mg^{2+}$
   All the four species are isoelectronic ($1s^2 2s^2 2p^6$). The number of positive charges in the nucleus decreases in the order 12 Mg > 11 Na > 9F > 8O. Hence O^{2-} involved minimum nucleus -electrons attraction and maximum electron-electron repulsion while Mg^{2+} involves maximum nucleus electrons attraction and minimum electron-electron repulsion. These factors make the size of anion greater than the corresponding neutral atom and that of cation lesser than the corresponding atom.

2. $Na_2O_2 < MgO < ZnO < P_2O_5$
   Oxides of electropositive elements are alkaline while those of electronegative elements are acidic. Alkaline property will increase of electropositive character of metal and acidic characteristics increase with increase of electronegative characteristic of nonmetals. Since the electronegativity increases in the order Na < Mg < Zn. The acidic character of oxide will also increases in the same order.

3. Na < Al < Mg < Si

$_{11}Na$	$1s^2 2s^2 2p^6 3s^1$
$_{12}Mg$	$1s^2 2s^2 2p^6 3s^2$
$_{13}Al$	$1s^2 2s^2 2p^6 3s^2 3p^1$
$_{14}Si$	$1s^2 2s^2 2p^6 3s^2 3p^2$

   Aluminium will have lower ionization potential than magnesium as the removal of one electron leads to the formation of stable completely filled orbital configuration. So it is loosely held and can be removed more easily than to remove electron from filled 3s orbital of magnesium atom.

4. $N_2 < O_2 < F_2 < Cl_2$
   Nitrogen contains triple bond, oxygen contains double bond and fluorine and chlorine contain a single bond each chlorine involves bonding of 3p orbitals while fluorine involves 2p orbitals.

5. $Ca^{2+} < Cl^- < S^{2-} < Ar$
   the given species are isoelectronic. The size of cation will be the smallest. The mononegative anion will have smaller size than the dinegative anion. The size of the noble gas Ar will be maximum.

6. $HClO < HClO_2 < HClO_3 < HClO_4$
   These acids are better represented as Cl-OH, OCl-OH, O_2 Cl-OH, O_3Cl-OH. The large the number of oxygen atoms attached to chlorine, greater the electron pull towards oxygen. Hence, more easy to remove hydrogen from the acid.

Learning Technique Card 11

AAROHAN

18. $Li < Na < K < Rb < Cs$
    The reactivity increases on descending the group I.

19. $Cs < Rb < K < Na < Li$
    The ease of formation of hydrides decreases on descending the group I.

20. $Cs < Rb < K < Na < Li$
    The melting (or boiling) point decreases on descending the group.

21. $LiOH < NaOH < KOH < RbOH < CsOH$
    The basic nature of hydroxides of elements of group I increases on descending the group.

22. $LiOH < NaOH < KOH < RbOH < CsOH$
    Thermal stability of hydroxides increases on descending the group.

23. $LiCl < LiBr < LiI$
    The smaller sized Li^+ ions polarised the larger anion more predominately giving larger covalent character.

24. $BeCl_2 < MgCl_2 < CaCl_2 < SrCl_2 < BaCl_2$

25. $BeCO_3 < CaCO_3 < MgCO_3 < BaCO_3$
    On moving down the group, the lattice energies of carbonates do not decreases much while the degree of hydration of the metal ions decreases significantly leading to increases solubility.

26. $BeF_2 > MgF_2 > CaF_2 > BaF_2$
    Lattice energy variation is more dominating than the variation in hydration energy.

27. $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2 < Ba(OH)_2$
    same as 26.

28. $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2 < Ba(OH)_2$

29. $Ba^{2+} < Sr^{2+} < Ca^{2+} < Mg^{2+} < Be^{2+}$
    The extent of hydration of ion decreases with increases in ionic size.

30. $Be < Mg < Ca < Sr < Ba$
    The reaction of alkaline earth metals becomes increasingly vigorous with increasing in atomic number.

31. $Be < Mg < Ca < Sr < Ba$

32. $BaSO_4 < SrSO_4 < CaSO_4 < MgSO_4 < BeSO_4$
    Hydration of ion plays a dominating role as compared to lattice energy.

AAROHAN

33. $BCl_3 < GaCl_3 < AlCl_3$
Increases in the electropositivity of element increases its ionic character.

34. $BF_3 < BCl_3 < BBr_3$
Besides σ bond between boron and halogen atoms, there exit additional pπ – pπ bond between the two atoms resulting from back donation of electrons from fluorine to boron (back bonding). The tendency to from pπ – pπ bond is maximum in BF_3(2pπ – 2pπ) back bonding and falls rapidly on passing to BCl_3 (2pπ – 3pπ) back bonding and BBr_3 (2pπ–4pπ back bonding). The tendency to accept electron pair, therefore, increase from BF_3 to BBr_3.

35. $InCl_3 < GaCl_3 < AlCl_3$
with increases in size of elements of group 13, the tendency to accept electron pair is decreased.

36. $PbCl_2 < SnCl_2 < GeCl_2$
The stability of element in +11 oxidation state increases on ascending the group 14. This is due to inert pair effect.

37. $GeCl_4 < SnCl_4 < PbCl_4$
The stability of element in +IV oxidation state decrease on ascending the group 14. This is due to inert-pair effect.

38. $Sn < Si < C$
The number of hybride orbitals and ease with which these are formed decreases from carbon to lead.

39. $SbH_3 < AsH_3 < PH_3 < NH_3$
The decrease in electronegativity and increase in size of element cause the decrease in tendency to accept proton.

40. $SbH_3 < AsH_3 < PH_3 < NH_3$

41. $H_3SbO_4 < H_3AsO_4 < H_3AsO_3 < HNO_3$

42. $H_3SbO_4 < H_3AsO_4 < H_3AsO_3 < HNO_3$

43. $Bi < Sb < As < P < N$

44. $NCl_3 < PCl_3 < AsCl_3 < SbCl_3 < BiCl_3$

45. $H_2Te < H_2Se < H_2S < H_2O$

46. $H_2S < H_2Se < H_2Te < H_2Po$

AAROHAN

7. $HI < HBr < HCl < HF$
As the size of the halogen atom increases, the strength of HX bond decreases. Besides this decreasing percent ionic character from HF to HI makes the bond less stable.

8. $HI < I_2 < ICl < HIO$
The oxidation state of iodine in HI, I_2, ICl and HIO_4 are –1, 0, + 1 and +7 respectively.

9. $HOCl < HOClO < HOClO_2 < HOClO_3$
The stability is explained by the increasing number of electron involved in the formation of σ and π bonds in going from HOCl to $HOClO_3$. In ClO_4^- ion all the valence orbitals and electrons of chlorine are involved in the formation of bonds.

10. $F_2 < Cl_2 < O_2 < N_2$
N_2 involves a triple bond, O_2 involves a double bond, F_2 and Cl_2 involve a single bond each. F_2 has a lower bond enthalpy than Cl_2. This is due to more repulsion of nonbonding electrons in F_2. Besides this, there is a possibility of multiple bonding in Cl_2 involving d orbitals.

11. $SiO_2 < CO_2 < N_2O_2 < SO_3$
Increasing electronegativity of an element makes its oxide more acidic.

12. $Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$

13. $NiO < MgO < SrO < K_2O < Cs_2O$
increasing electropositive nature of the element makes its oxide more basic.

14. $CCl_4 < MgCl_2 < AlCl_3 > SiCl_4 < PCl_5$
In covalent halides, hydrolysis occurs as a result of co-ordination of a water molecule to the less electronegative element. CCl_4 does not undergo hydrolysis as carbon cannot expand its octet to accommodate water molecules.

15. $S < Cl < N < O < F$
The negative charge on X in HX increase with increasing electronegativity of X. This makes the hydrogen bonding more strong.

16. $Cs^+ < Rb^+ < K^+ < Na^+ < Li^+$
The ions in solution are present as hydrated ions. The smaller the size of the ion, the greater the extent of hydration. So the size of hydrated ions becomes larger for smaller sized ion and vice verca.

17. $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$
Li^+ ion being highly hydrated has the lowest mobility and Cs^+ ion being less hydrated has the highest mobility.

AAROHAN

47. $H_2O < H_2S < H_2Se < H_2Te$
Large the size of X (=O, S, Se, Te) weaker its bonds with hydrogen and more easily H^+ gets lost in aqueous solution.

48. $H_2TeO_3 < H_2SeO_3 < H_2SO_3$
Decreasing size and increasing electronegativity from Te to S with draws electrons from O – H bond towards itself, thus, facilitating the release of proton.

49. $H_2SO_3 < H_2SeO_3 < H_2TeO_3$

50. $H_2TeO_4 < H_2SeO_4 < H_2SO_4$

51. $H_2TeO_4 < H_2SeO_4 < H_2SO_4$

52. $Cl > F > Br > I$

53. $HF < HCl < HBr < HI$

54. $I_2 > Br_2 > Cl_2 > F_2$

55. $HF < HCl < HBr < HI$

56. $HCl < HBr < HF < HI$
Anomalous behaviour of HF is due to hydrogen bonding.

57. $HCl < HBr < HI < HF$
Anomalour behaviour of HF is due to hydrogen bonding.

58. $HFO_3 < HClO_3 < HBrO_3 < HIO_3$
Ions of these acids are stabilized due to strong $p\pi$–$p\pi$ bonding between full 2p orbitals on oxygen and empty orbitals on the halogen atom. Fulorine has no d orbitals and cannot from $p\pi$-$d\pi$ bonds.

59. $TiCl_2 < TiCl_3 < TiCl_4$
Increasing oxidation state of Ti increases charge density on the metal leading to increases in the polarization of the anionic charge cloud and thus covalency increases. Thus oxacid of fluorine are not known.

60. $Zn^{2+} < Ti^{3+} < Ni^{2+} < Co^{2+} < Cr^{2+}$,
Increasing number of unpaired electrons increases magnetic moment. The number of unpaired electron in the given species are as follows.
Ti^{3+} one, Ni^{2+} two, Co^{2+} three, Cr^{2+} four and Zn^{2+} zero.

61. $VCl_4 < VCl_3 < VCl_2$
Decreasing oxidation state of element increases the ionic character.

FAMOUS PROCESS AND RELATED METAL

S.No.	Some Famous process	Related meal
1.	Poling	Cu. Sn
2.	Parkes Process	Ag
3.	Pattinson process	Ag
4.	Cupellation process	Ag
5.	Baeyer's process	Al
6.	Serpek's process	Al
7.	Hall's process (or)	Al
8.	Siemen's Martins Open hearth process	Fe
9.	Bessemer's process	Fe

OXIDE ORE

*ZnO	→	Zincite
*Fe_2O_3	→	Haematite
*Fe_3O_4	→	Magnetite
*$Al_2O_3 . 2H_2O$	→	Bauxite
*$Fe_2O_3 . 3H_2O$	→	Limonite
*Cu_2O	→	Cuprite or Ruby Copper
MnO_2	→	Pyrolusite
SnO_2	→	Tinstone or Casseterite
TiO_2	→	Rutile
$Fe.Cr_2O_4$	→	$(FeO + Cr_2O_3)$ Chromite ore
$Na_2B_4O_7.10H_2O$	→	Borax or Tincal
$Ca_2B_6O_{11}.5H_2O$	→	Colemanite
U_3O_8	→	Pitch Blende
$FeO.TiO_2$	→	Ilmenite

SULPHURISED ORE

*PbS	→	Galena
HgS	→	Cinnabar
*Zns	→	Zinc blende/sphalerite
*Cu_2S	→	Copper glance/Chalcocite
$CuFeS_2$	→	Copper Pyrite (Chalcopyrite)
*FeS_2	→	Iron pyrite of Fool's gold
Ag_2S	→	Silver glance or Argentite

HALIDE ORE

NaCl	→	Rock Salt
KCl	→	Sylvine
CaF_2	→	Fluorspar
Na_3AlF_6	→	Cryolite
AgCl	→	Horn Silver
$KCl.MgCl_2.6H_2O$	→	Carnalite
$Cu_2Cl(OH)_3$	→	Atacamite

OXY SALT ORE

1. *Carbonate Ore:*

$CaCO_3$	→	Lime stone
$MgCO_3$	→	Magnesite
$CaCO_3 . MgCO_3$	→	Dolomite
*$FeCO_3$	→	Siderite
* $ZnCO_3$	→	Calamine
* $Cu(OH)_2 . CuCO_3/Cu_2(OH)_2CO_3$	→	Malachite or Basic Copper Carbonate
$Cu(OH)_2 . 2CuCO_3$	→	Azurite
$PbCO_3$	→	Cerrusite

2. *Sulphate Ore:*

$CaSO_4 . 2H_2O$	→	Gypsum
$MgSO_4 . 7H_2O$	→	Epsom Salt
$PbSO_4$	→	Anglesite
$BaSO_4$	→	Baryte
$Na_2SO_4 . 10H_2O$	→	Glauber Salt
$CuSO_4 . 5H_2O$	→	Chalcanthite

3. *Nitrate Ore:*

KNO_3	→	Indian Salt Peter
$NaNO_3$	→	Chile Salt Peter

METALS IN LIVING ENTITIES

(a) **Magnesium** is found in chlorophyll.
(b) **Potassium** is present in plant roots.
(c) **Manganese**, **iron** and **copper** are present in chloroplast.
(d) **Zinc** is present in eyes of cats and cows.
(e) **Iron** is present in haemoglobin.
(f) **Calcium** is present in bones.
(g) **Vanadium** is present in cucumbers.
(h) **Chromium** is present in prawn.
(i) **Cobalt** is present in cynocobalamin (Vitamine)

ALLOYS

S.No.	Name of Alloy	Composition	Uses
1.	Magnelium	Al : 98%, Mg : 2%	For making balance
2.	Duralumin	Al : 95%, Cu : 4%	Air craft parts
		Mg : 0.5%, Mn : 0.5%	boat machinary
3.	Aluminium bronze	Al : 10%, Cu : 90%	Making coins, photo frames
			utensils, golden paints
4.	Alnico	Al : 20%, Ni : 20%	For making permanent
		Co : 10% Steel : 50%	magnet
5.	γ-Alloy	Al : 92%, Cu : 4%	Pistons and machine parts
		Mg : 1.5%, Ni : 2.5%	
6.	Nickeloy	Al : 95%, Cu : 4%, Ni : 1%	Air craft parts
7.	Pewter	Pb : 20, Sn : 80	Utensils
8.	Solder	Pb : 50, Sn : 50	Soldering
9.	Type metal	Pb : 75, Sn : 5, Sb : 20	Printing type
10.	Bell metal	Cu : 80, Sn : 20	Bells making
11.	Babbit metal	Sn : 90, Sb : 7, Cu : 3	Bearing of machinary
12.	Frary metal	Pb : 97%, Ba : 2%, Ca : 1%	Bearing of machine
13.	Lino type metal	Pb : 83%, Sn : 3%, Sb:14%	Printing type
14.	Brass	Cu : 70%, Zn: 30%	Making utensils condenses tube making
15.	Bronze	Cu : 88-96%, Sn 4-12%	Utensils, coins, statues

16.	Monel metal	Cu : 27%, Ni : 68%, Fe : 5%	Making pumps, turbines of ships, boilers etc.
17.	German silver	Cu:50%, Zn: 30%, Ni:20%	Flower Vase & ornaments
18.	Electron	Mg:95%, Zn:4.5,Cu:0.5%	Parts of aeroplane and motor cars
19.	Dutch metal	Cu: 80%, Zn: 20%	Golden yellow colour used for decorative purpose
20.	Nichrome	Ni, Cr, Fe	
21.	Gun Metal	Cu : 87%, Zn:3%,Sn:10%	
22.	Constantan	Cu:60 %, Ni : 40%	
23.	Artifical Gold	Cu : 90%, Al : 10%	
24.	14 Carat Gold	Au : 54%, Ag : 14% to 30%, Cu : 12-28%	
25.	24 Carat Gold	100% Au	

ALLOY OF STEEL

1.	Vanadium	V : 0.2 - 1%
2.	Chromium	Cr : 2 - 4%
3.	Nickel	Ni : 3 - 5%
4.	Manganese steel	Mn : 10 - 18%
5.	Stainless steel	Cr : 12 - 14% and Ni : 2 - 4%
6.	Tungsten	W : 10 - 20%
7.	Invar	Ni : 36%

Learning Technique Card 20

SOME IMPORTANT COMPOUNDS, MINERALS, MIXTURES & THE FORMULA'S

1.	Epsom salt	$MgSO_4.7H_2O$
2	Gypsum salt	$CaSO_4.2H_2O$
3.	Glauber's salt	$Na_2SO_4.10H_2O$
4.	Lime water	$Ca(OH)_2$(slaked lime)
5.	Quick lime	CaO
6.	Washing Soda	$Na_2CO_3.10H_2O$
7.	Crystal carbonate	$Na_2CO_3.H_2O$
8.	Soda ash	Na_2CO_3
9.	Baking Soda	$NaHCO_3$
10.	Turn bull's blue	$Fe_3[Fe(CN)_6]_2$
11.	Chile salt petre	$NaNO_3$
12.	Indian salt petre	KNO_3
13.	Brine or Table salt or Rock Salt	$NaCl$
14.	Potash ash or Pearl ash	K_2CO_3
15.	Nitre or Indian salt petre or Chemical refrigenant	KNO_3
16.	Norwegian salt petre	$Ca(NO_3)_2$
17.	Salt Cake	K_2SO_4
18.	Carnallite	$KCl.MgCl_2.6H_2O$
19.	Hypo	$Na_2S_2O_3.5H_2O$
20.	Borax or Tincal	$Na_2B_4O_7.10H_2O$
21.	Barytes or Heavy spar or Barium meal	$BaSO_4$
22.	Baryta	$Ba(OH)_2$
23.	Magnesia	MgO
24.	Microcosmic salt	$NaNH_4HPO_4.4H_2O$
25.	Nitrolium	$CaCN_2$
26.	Hydrolith	CaH_2
27.	Fusion mixture	$Na_2CO_3 + K_2CO_3$
28.	Gun powder	$KNO_3 + K_2CO_3$
29.	Pink salt	$(NH_4)_2SnCl_6$
30.	Laughing gas	N_2O(nitrous oxide)
31.	Red Lead	Pb_3O_4
32.	Blue vitriol	$CuSO_4.5H_2O$
33.	Green vitriol	$FeSO_4.7H_2O$
34.	Chiense White	ZnO
35.	Philosopher's wool	ZnO

Learning Technique Card 18

PPT OF BASIC RADICALS

1. I-group radicals are precipitated in form of colorides.
   - $AgCl$ — White
   - Hg_2Cl_2 — White
   - $PbCl_2$ — White
2. IIA and IIB-groups radicals are precipitated in form of sulphides.
   - HgS — Black
   - PbS — Black
   - GuS — Black
   - CdS — Yellow
   - Bi_2S_3 — Black
   - AS_2S_3 — Yellow
   - Sb_2S_3 — Orange
   - SnS — Brown
   - SnS_2 — Yellow
3. III-group radicals are precipitated in form of their hydro-oxides.
   - $Fe(OH)_3$ — Red/Brown
   - $Cr(OH)_3$ — Green
   - $Al(OH)_3$ — Gel White
4. IV-group radicals are precipitated in form of sulphides.
   - MnS — Buff
   - CoS — Black
   - ZnS — White
   - NiS — Black
5. V-group radicals are precipitated in form of carbonates
   - $BaCO_3$ — White
   - $SrCO_3$ — White
   - $CaCO_3$ — White

SOME IMPORTANT COMPOUNDS, MINERALS, MIXTURES & THE FORMULA'S

36.	Oil of Vitriol	H_2SO_4
37.	Mohr's salt (Ferrous ammonium sulphate)	$FeSO_4(NH_4)_2SO_4.6H_2O$
38.	Lunar Caustic	$AgNO_3$
39.	Calomel	Hg_2Cl_2
40.	Corrosive sublimate	$HgCl_2$
41.	Potash alum	$K_2SO_4.Al_2(SO_4)_3.24H_2O$
42.	Chrome alum	$K_2SO_4.Cr_2(SO_4)_3.24H_2O$
43.	Ferric alum	$Fe_2(SO_4)_3(NH_4)_2SO_4.24H_2O$
44.	Chrome lemon (or) yellow chrome	$PbCrO_4$
45.	Pyrolusite	MnO_2
46.	Cementitte (Iron Carbide)	Fe_3C
47.	Nessler's reagent	K_2HgI_4
48.	Lead sugar	$(CH_3COO)_2Pb$
49.	White lead	$Pb(OH)_2.2PbCO_3$
50.	Rock Phosphate	$Ca_3(PO_4)_2$
51.	Rochelle salt	$\begin{matrix}CH(OH)COONa\\ \vert \\ CH(OH)COOK\end{matrix}$
52.	Flour spar	CaF_2
53.	Anhydrone	$Mg(ClO_4)_2$
54.	Asbestos	$CaMg_3(SiO_3)_4$
55.	Sorel's cement	$MgCl_2.5HgO, H_2O$
56.	Lithopone	$BaSO_4 + ZnS$
57.	Witherite	$BaSO_3$
58.	Tough pitch Copper	99.5% pure Cu
59.	Lead pencil	Graphite
60.	Aqua regia	Conc. HNO_3 + Conc. HCl (1 : 3)
61.	Ammonium alum	$(NH_4)_2SO_4.Al_2(SO_4)_3.24H_2O$
62.	Sodium Alum	$Na_2SO_4.Al_2(SO_4)_3.24H_2O$
63.	Prussian blue	$Fe_4[Fe(CN)_6]_3$
64.	Baking powder	$NaHCO_3$, Tartaric acid
65.	Plaster of Paris	$2CaSO_4.H_2O$ or $CaSO_4.1/2\,H_2O$
66.	Killed Salt (or) Butter of Zinc	$ZnCl_2.2H_2O$
67.	oxymuriate (or) Butter of Tin	$SnCl_4.5H_2O$
68.	Verdigris	$Cu(OH)_2.CuCO_3$

IMPORTANT FACTS TO REMEMBER

1.	Lowest electronegativity	:	Cs, Fr
2.	Highest electronegativity	:	F
3.	Highest ionisation potential	:	He
4.	Lowest ionisation potential	:	Cs, Fr
5.	Lowest electron affinity	:	Noble gases
6.	Highest electron affinity	:	Chlorine
7.	Least electropositive element	:	F
8.	Lowest m.pt. metal	:	Hg
9.	Highest m.pt. and b.pt. metal	:	W (Tungesten)
10.	Lowest m.pt. and b.pt. non metal	:	He
11.	Notorious element	:	Hydrogen
12.	Lightest element	:	Hydrogen
13.	Smallest atomic size	:	H
14.	Largest atomic size	:	Cs
15.	Largest anionic size	:	I^-
16.	Smallest cation	:	H^+
17.	Most electropositive element	:	Cs, Fr
18.	Volatile d block elements	:	Zn, Cd, Hg
19.	Most stable element	:	Te
20.	Highest density (Metals)	:	Os, Ir
21.	Highest density (Non metals)	:	Boron
22.	Total number of radioactive elements in periodic table	:	25
23.	Liquid element of radioactive nature	:	Fr
24.	Element containing no neutron	:	H
25.	Most abundant element on earth	:	Oxygen
26.	Rarest element on earth	:	At (astatine)
27.	Most abundant metal on earth	:	Al
28.	Metals showing highest ox. no	:	Os (+ 8)
29.	Most electrovalent compound	:	CsF
30.	Most stable carbonate	:	Cs_2CO_3
31.	Strongest alkali	:	CsOH
32.	Strongest basic oxide	:	Cs_2O
33.	Best electricity conductor among metals	:	Ag
34.	Best electricity conductor among non metals	:	graphite
35.	Element having maximum tendency for catenation	:	Carbon
36.	Element with electronegativity next to Fluorine	:	Oxygen
37.	Group containing maximum no. of gaseous elements in the periodic table	:	Zero group
38.	Amphoteric non metal	:	Si
39.	Liquid non metals	:	Br

IMPORTANT FACTS TO REMEMBER

40.	Elements sublime on heating	:	I_2
41.	Noble metals	:	Au, Pt etc.
42.	Some polymorphic elements	:	O, S, P
43.	Poorest conductor of electricity	:	Diamond
44.	Hardest naturally occurring element	:	Diamond
45.	Lightest solid metal	:	Li
46.	90% of Sun mass	:	Hydrogen
47.	Dry Bleacher	:	H_2O_2
48.	Dry ice	:	Solid CO_2
49.	Element having maximum isotopes	:	Sn (10)
50.	Oldest known organic acid	:	CH_3COOH
51.	Total number of solid elements in periodic table	:	89
52.	Amphoteric metal	:	Be, Zn, Al, Sn, Pb
53.	First man made element	:	Tc_{43} (Technicium)
54.	Smallest period	:	Ist (2 element)
55.	Largest period in periodic table	:	6th (32 element)
56.	Largest group in periodic table	:	IIIB (32 element)
57.	Most abundant d-block metal	:	Fe
58.	Most abundant s- block metal	:	Ca
59.	Most poisonous element	:	Pu (Plutonium)
60.	Elements kept in water	:	Phosphorous
61.	Neutral oxides of non metals	:	NO, CO, H_2O, N_2O
62.	Non metals having metallic lusture	:	Graphite, Iodine
63.	Heaviest naturally occurring elements	:	Uranium
64.	Non metal having highest m. pt. b. pt	:	Carbon (diamond)
65.	Total number of gaseous elements in periodic table	:	11 (H, N, O, F, Cl, He, Ne, Ar, Kr, Xe, Rn)
66.	Total number of liquid elements in periodic table	:	5 (Ga, Br, Cs, Hg, Fr)
67.	Elements kept in kerosene	:	IA group element (Na etc.)
68.	Metalloids elements	:	B, Si, As, Te, At, Ge, Sb etc.
69.	Amphoteric oxides	:	BeO, Al_2O_3, ZnO, PbO, SnO_2, Sb_2O_3 etc.
70.	Artificial explosive	:	TNT, RDX (Research Developed Explosive etc.)
71.	First noble prize of chemistry was given to	:	Van't Haff
72.	Some isomorphous substances	:	$FeSO_4.7H_2O$, $MgSO_4.7H_2O$, $ZnSO_4.7H_2O$
73.	Some efflorescent substances	:	$Na_2CO_3.10H_2O$, $MgSO_4.7H_2O$ etc.

SOME IMPORTANT COMPOUNDS, MINERALS, MIXTURES & THE FORMULA'S

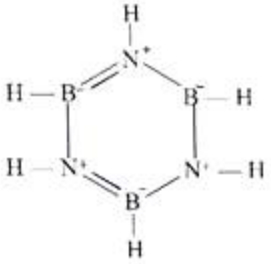
69.	Bourdex mixture	$CuSO_4$(40%) + lime(60%)
70.	Candy fluid	$KMnO_4$
71.	Per Hydrol	H_2O_2
72.	Blue Vitriol	$CuSO_4.5H_2O$
73.	White vitriol	$ZnSO_4.7H_2O$
74.	Green vitriol	$FeSO_4.7H_2O$
75.	Sal Ammonic	NH_4Cl
76.	Smelling salt	$(NH_4)_2SO_4$
77.	Fruit salt	$Mg(HCO_3)_2$
78.	Cal gon	$Na_2[Na_4(PO_3)_6]$
79.	Red chrome	$PbCrO_4.PbO$
80.	Sorel cement	$MgCl_2.5MgO.xH_2O$
81.	Common salt	NaCl
82.	Silvine	KCl
83.	Lime water	$Ca(OH)_2$
84.	Quick lime	CaO
85.	Alumina	Al_2O_3
86.	Muriatic acid	HCl
87.	Aqua fortis	HNO_3
88.	Silicates.	$(SiO_4)^{4-}$
89.	Inorganic graphite	$(BN)_x$
90.	Inorganic benzene	$B_3N_3H_6$
91.	Boric acid	H_3BO_3
92.	Indian red	Fe_2O_3
93.	Indian yellow /Fishcer salt	$K_3[Co(NO_2)_6]$
94.	Diborane	B_2H_6
95.	Smuglling agent	$Na[Ag(CN)_2]$
96.	Caro's acid	H_2SO_5
97.	Marshells acid	$H_2S_2O_7$
98.	Tear gas	CCl_3NO_2
99.	Zieses salt	$K[Pt\text{-}(\eta^2\text{-}C_2H_4)\text{-}Cl_3]H_2O$
100.	Vaska's compound	$trans\text{-}(Ir(Cl)(CO)(PPh_3)_2)$
101.	Cobalt cene	$[Co^{II}(\eta^5\text{-}C_5H_5)_2]$
102.	Magnesia alba	$MgCO_3,Mg(OH)_2.3H_2O$ (used in tooth powders and tooth paste)
103.	Portland cement : Homogeneous mixture of silicates and aluminates of calcium.	

PRECIPITATION CHART

Cation	Anion	Solubility	Exception
Any	$HS^-, NO_3^-, NO_2^-, OCl^-, ClO_2^-, ClO_3^-, ClO_4^-$, $HSO_3^-, HCO_3^-, CH_3COO^-$ हरि शंकर के नाई कोल्हू का बैल और बाई एक से हैं।	Yes	ClO_4^- of NH_4^+, Rb^+, Cs^+, K^+ are insoluble अमीन रब से कहे $AgNO_2$ is insoluble. CH_3COOAg is partially soluble
Na^+	Any	Yes	Na_2SiO_3 and Na_2PbO_3 are insoluble
NH_4^+, Rb^+, Cs^+, K^+ अमीन रब से कहे	Any	Yes	ClO_4^-, $[PbCl_6]^{2-}$, $[Co(NO_2)_6]^{3-}$ are insoluble
Any	Cl^-, Br^-, I^- C . B . I.	Yes	Ag^+, Cu_2^{2+}, Pb^{2+}, Hg_2^{2+} are insoluble आज कुत्ते पागल होगें $CuBr_2$, $PbCl_2$, $HgCl_2$ are soluble in warming and reappear on cooling. $HgBr_2$, HgI_2, BiI_3 are insoluble
Any	SO_4^{2-}	Yes	Ag^+, Sr^{2+}, Ba^{2+}, Pb^{2+}, Hg_2^{2+} आज सारे बाराती पागल होगें Ca^{2+}, Sn^{2+} are partially soluble.
Any	O^{-2}(Oxide), $C_2O_4^{-2}$ (Oxalate) OX- दो OH^-, CO_3^{-2}, F^- हाथी एक Cow एक Fox एक PO_4^{-3} के पांव चार	No	NH_4^+, Na^+, Rb^+, Cs^+, K^+ are soluble. अमीन रब से कहे BeF_2, AgF are soluble. oxides and hydroxides of Ca and Ba are partially soluble
Any	$CN^-, OCN^-, SCN^-, S^{-2}$	No	IA, IIA and Al^{+3}, NH_4^+ are soluble.
Any	CrO_4^{2-} (is similar to SO_4^{2-})	Yes	$SrCrO_4$ is soluble (same as sulphates)
Any	MnO_4^- (is similar to ClO_4^-)	Yes	$KMnO_4$ is soluble

IMPORTANT STRUCTURES

1. **Inorganic benzene (or) Borazine**



(or) Borazole

2. **$(BN)_n$ Inorganic graphite**

3. **Calcium carbide**

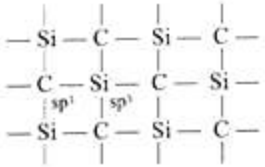
$CaC_2 + N_2 \rightarrow \underbrace{CaCN_2}_{\text{Nitrolium (Used as fertilizer)}} + C$

$Ca^{2+}[C \equiv C]^{2-}$

$Ca^{2+}[N^- = C = N^-]$

Calcium cynamide

4. **Carborundum**

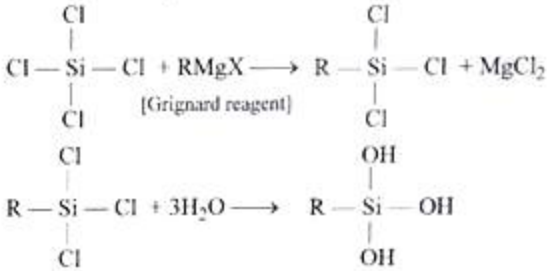


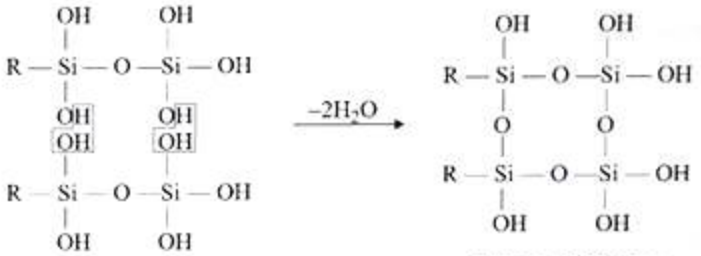
Used for cutting of glass

5. **Silicates**

IMPORTANT STRUCTURES

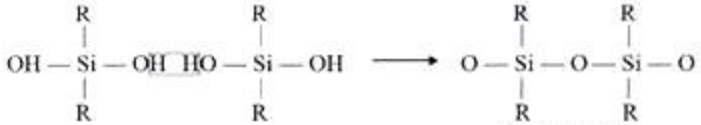
1. **Conversion $SiCl_4$ to Silicon**





Network Silicones

If 2 molecules of RMgX are taken

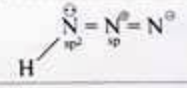


Chain Silicate

Dimer

2. **Hydrazine**

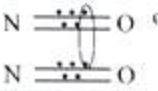
3. **Hydrazoic acid**



IMPORTANT STRUCTURES

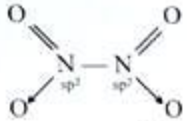
4. C_3O_2

5. NO [paramagnetic]as monomer (N_2O_2)



odd electron bond

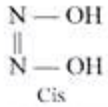
6. NO_2 (N_2O_4)



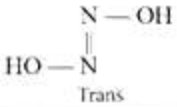
white colour in solid

[Dimagnetic, colourless]

7. Hypo nitrous acid

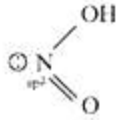


Cis



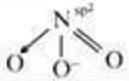
Trans

8. HNO_2

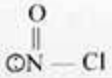


9. NO_2^-

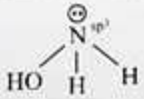
10. NO_3^-



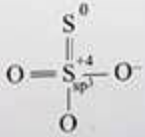
11. NOCl [Nitrosyl chloride]



12. Hydroxyl Amine

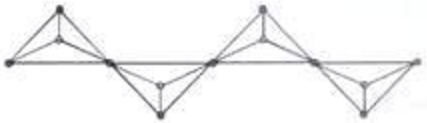


13. $S_2O_3^{2-}$ (Thiosulphate ion)



IMPORTANT STRUCTURES

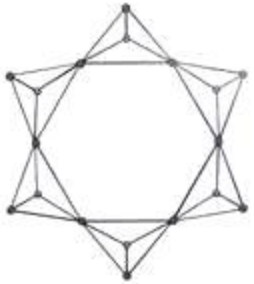
6. Chain Silicate



$[Si_4O_{11}]^{-10}$

e.g., pyroxene

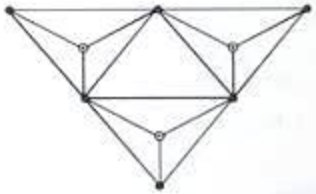
7. Ring silicate



$[Si_6O_{18}]^{-12}$

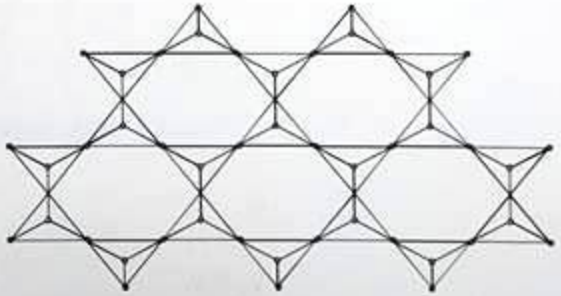
e.g., Jwell Emerald

8. $[Si_3O_7]^{6-}$



●–Oxygen
⊛–Silicon

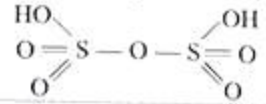
Sheet silicate



e.g., Mica/ Asbestos

IMPORTANT STRUCTURES

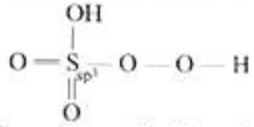
14. **Oleum [Fuming sulphuric acid] [Northason's sulphuric acid] [pyrosulphuric acid]**



15. **Marshall's acid**

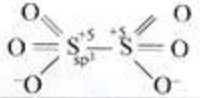
Peroxodisulphuric acid

16. **Caro's acid**

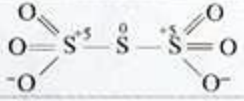


Peroxomonodisulphuric acid

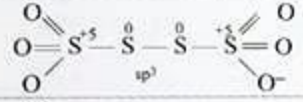
17. **Dithionate ion**



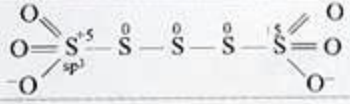
18. **Trithionate ion**



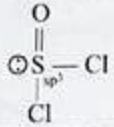
19. **Tetrathionate ion**



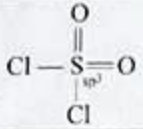
20. **Pentathionate ion**



21. **Thionyl chlorice**



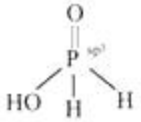
22. **Sulphuryl chloride**



23. **OCl_2**

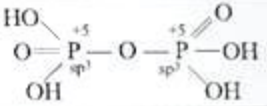
IMPORTANT STRUCTURES

32. **Hypophosphorous acid H_3PO_2**

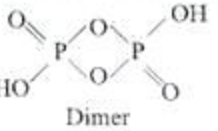


Monobasic acid
[acts as reducing agent]

33. **Pyrophosphoric acid**



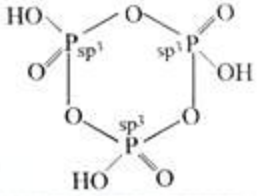
34. **Metaphosphoric acid**



Dimer

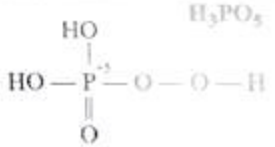
2POP

35.

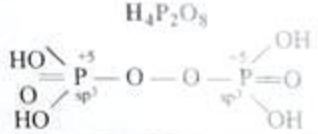


Trimer
3POP

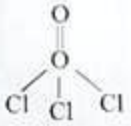
36. **Peroxyphosphoric acid(H_3PO_5)**



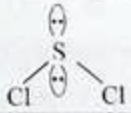
37. **Peroxy diphosphoric acid**



38. **$POCl_3$**



39. **SCl_2**



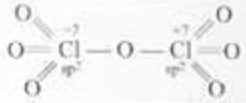
IMPORTANT STRUCTURES

24. OF_2

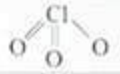
25. H_2O

26. ClO_2

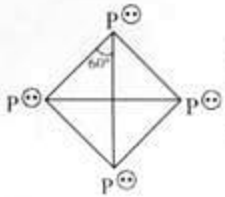
27. Cl_2O_7



28. $[ClO_3^-]$ [Chlorate ion]

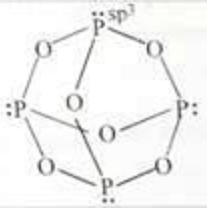


29. P_4

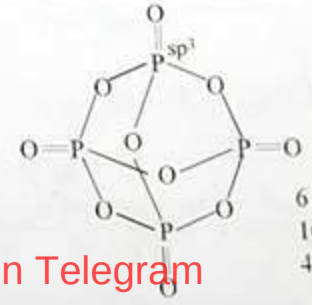


Angle = 60°
Total no. of bonds = 6
Each P has one lone pair of electron

30. P_4O_6



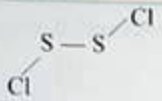
31. P_4O_{10}



6 POP bonds
16 σ bonds
4 π bonds

IMPORTANT STRUCTURES

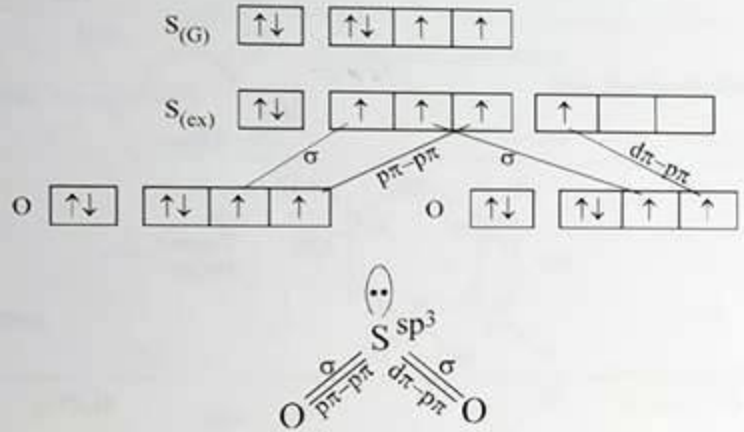
40. S_2Cl_2 half open booklet



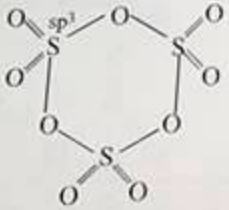
41. SeO_2

Solid SeO_2

42. SO_2



43. SO_3



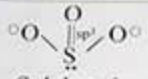
3SOS bonsa
O-O bond is zero
S – S bond is zero
12 S – O bonds

Cyclic Trimer [Vapour]

HCl - Muriatic acid; HNO_3 - Aqua fortis

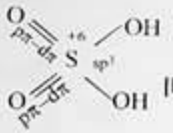
IMPORTANT STRUCTURES

44. SO_3^{2-}



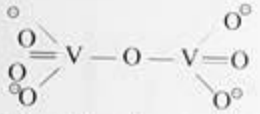
Sulphate ion

45. H_2SO_4 [oil of vitriol]



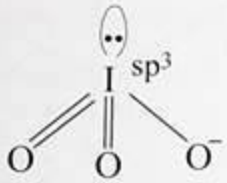
[king of chemicals]

46. $V_2O_7^{4-}$



Divandium heptaoxide

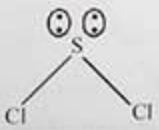
47. IO_3^-



48. Calcium carbide — $Ca^{2+}(C \equiv C)^{2-}$

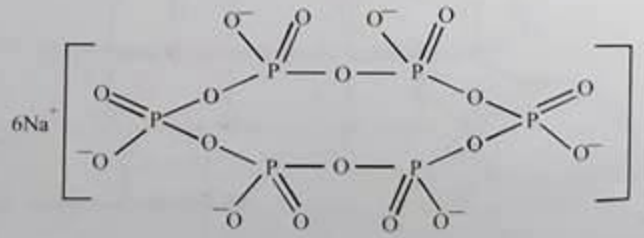
49. S_2Cl_2 — $Cl-S-S-Cl$

50. SCl_2



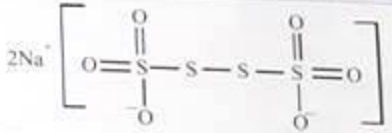
51. $CaCN_2$ (Calcium Cynamide) — $Ca^{2+}(N^- = C = N^-)$

52.

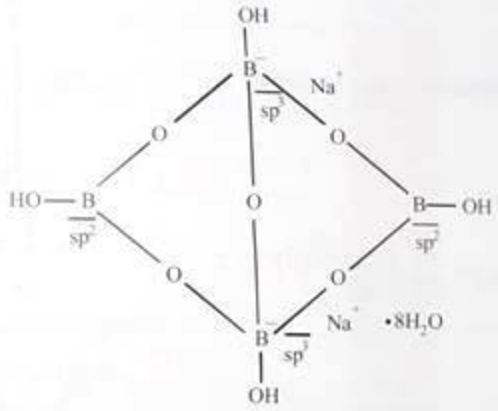


IMPORTANT STRUCTURES

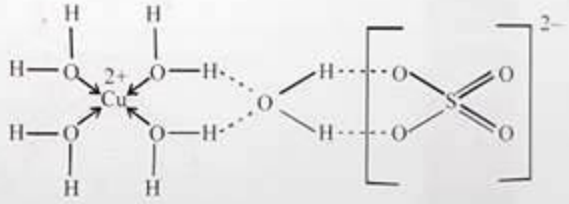
60. $Na_2S_4O_6$



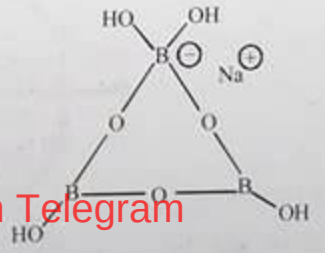
61. $Na_2B_4O_7 \cdot 10H_2O$



62. $CuSO_4 \cdot 5H_2O$

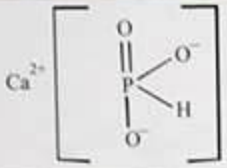


63. $Na\,[B_3O_3(OH)_4]$

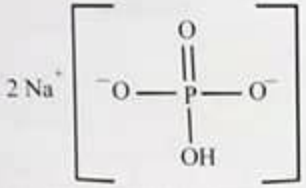


IMPORTANT STRUCTURES

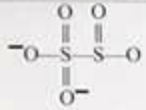
64. Calciumphosphite



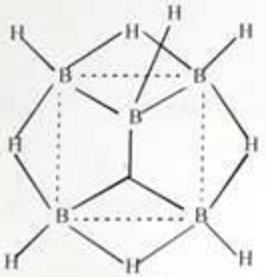
65. Disodiumhydrogen phosphate



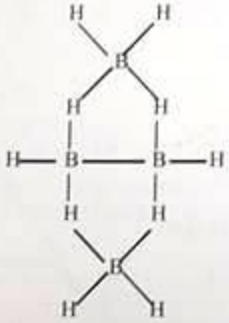
66. $[S_2O_5]^{2-}$



67. B_5H_9

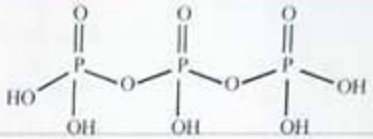


68. B_4H_{10}

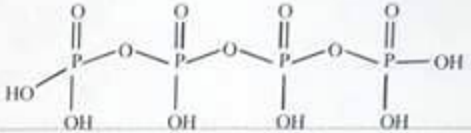


IMPORTANT STRUCTURES

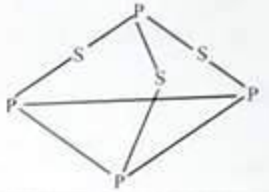
53. $H_5P_3O_{10}$



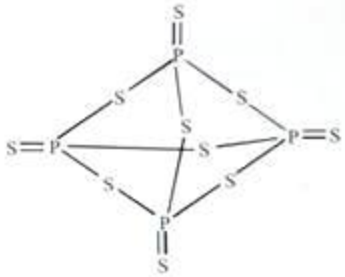
54. $H_6P_4O_{13}$



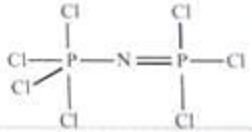
55. P_4S_3



56. P_4S_{10}

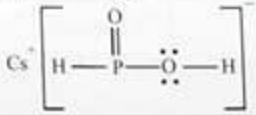


57. P_2NCl_7 (linear phosphagine)



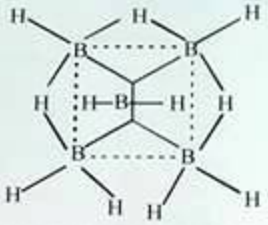
58. $P_4N_3Cl_{11}$

59. CsH_2PO_2

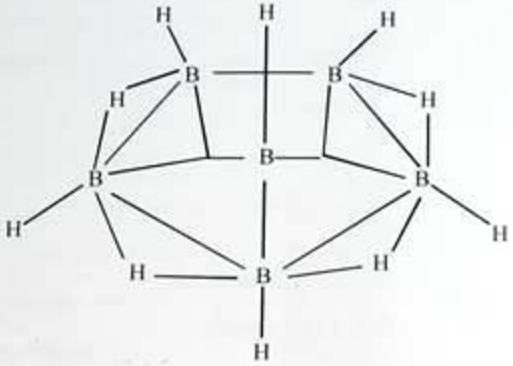


IMPORTANT STRUCTURES

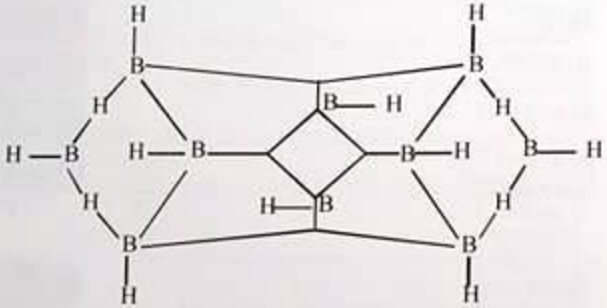
69. B_5H_{11}



70. B_6H_{10}



71. $B_{10}H_{14}$



72. B_2H_6

COLOUR OF COMPOUNDS

PbO_2	Black Brown
PbO(Massicot)	Yellow
Na_2O_2	Yellow White
ZnO(Philospher's wool)	White
CaO(Quick lime)	White
PbO(litharge)	Red
Pb_3O_4(minium; red lead)	Red
Cu_2O	Red
Fe_2O_3(Indian Red)	Red
HgO	Orange Red
CdO	Brown
CoO.ZnO(Rinmann's green)	Green
CoO.MgO (Cobalt pink)	Pink
CoO.SnO(Cobalt green)	Green
$CoO.Al_2O_3$(Thenard blue)	Blue
Cr_2O_3	Green
$Cr(O_2)_2O$ (butterfly structure)	Blue
KO_2(Super oxide)	Orange
Li_2O	Red
Na_2O	Black

FERRO CYNIDE

$K_4[Fe(CN)_6]$	Pale Yellow
$K_3[Fe(CN)_6]$	Light Blue
$Cu_2[Fe(CN)_6]$	Chocolet Brown
$Fe_4[Fe(CN)_6]_3$(Prussian blue)	Blue
$Fe_2[Fe(CN)_6]_3$(Turnbull's blue)	Blue

COLOUR OF COMPOUNDS

$Zn_2[Fe(CN)_6]$	White
$Cd_2[Fe(CN)_6]$	Light Blue

HALIDES

AgCl	White
Hg_2Cl_2	White
$HgCl_2$	White
Cu_2Cl_2	White
$PbCl_2$	White
$PbBr_2$	White
$ZnCl_2.H_2O$ (Butter of zinc; killed salt)	White
KCl (Silvine)	White
NH_4Cl (Salammonic)	White
$SnCl_4.5H_2O$ (Oxymuriate; butter of tin)	White
AgI	Yellow
PbI_2	Yellow
BiI_3	Yellow
HOBr (Layer test)	Yellow
AgBr	Yellow
Cu_2I_2	Yellow
$NiCl_2$	Green
$CrCl_3$	Green
$FeCl_2$	Green
$CoCl_2$ (An hydrous)	Blue
$CoCl_2$ (dil. solution; symphathetic ink)	Pink
$CuCl_2$	Blue Green
$FeCl_3$	Black Red

COLOUR OF COMPOUNDS

SULPHIDES

HgS (vermillion)	Black
PbS	Black
CuS	Black
Bi_2S_3	Black
Cu_2S	Black
CoS	Black
Ag_2S	Black
FeS	Black
NiS	Black
Na_2S	Black
CdS	Yellow
SnS_2 (Artificial gold)	Yellow
FeS_2 (fool's gold)	Yellow
As_2S_3	Yellow
As_2S_5	Yellow
Sb_2S_3	Orange
Sb_2S_5	Orange
SnS	Brown
ZnS	White

OXIDES

Hg_2O	Black
Ag_2O	Black
MnO_2 (Pyrolusite)	Black
CuO	Black
Ni_2O_3	Black

Learning Technique Card 41

COLOUR OF COMPOUNDS

$FeCl_3.6H_2O$	Red Brown
$FeCl_3.6H_2O$(Solution)	Yellow
BiI_3	Black
KI_3	Brown
HgI_2	Red
$K[BiI_4]$ (Solution)	Orange

CHROMATES

$PbCrO_4$ (Yellow chrome)	Yellow
$BaCrO_4$	Yellow
Na_2CrO_4 (Solution)	Yellow
Ag_2CrO_4	Brick Red
Hg_2CrO_4	Scarlet Red
$PbCrO_4.PbO$ (Red chrome)	Red
$K_2Cr_2O_7$(Prismatic structure)	Orange

SULPHATES AND SULPHITES

Ag_2SO_4	White
Hg_2SO_4	White
$SrSO_4$	White
$BaSO_4$	White
$PbSO_4$	White
Ag_2SO_3	White
Hg_2SO_3	White
$SrSO_3$	White
$BaSO_3$	White
$PbSO_3$	White
$CaSO_4.2H_2O$(Gypsum)	White

Learning Technique Card 43

COLOUR OF COMPOUNDS

Cr_2O_3	Green
$[Cr(H_2O)_5Cl]Cl_2.H_2O$	Pale Green
$[Cr(H_2O)_4Cl_2]Cl.2H_2O$	Dark Green
$[Cr(H_2O)_6]Cl_3$	Violet

Ni^{+2}

$NiCl_2$	Green
$Ni(OH)_2$	Green
$(DMG)_2Ni$	Rosy Red

Ag^+

AgCl	White
AgBr	Pale Yellow
AgI	Yellow
Ag_2SO_4	White
$Ag_2S_2O_3$	White
Ag_2CO_3	Yellow
Ag_3PO_4	Yellow
Ag_2AsO_3	Yellow
Ag_3AsO_4	Red
Ag_2CrO_4	Red
Ag_2S	Black
Ag_2O	Black

MISCELLANEOUS

$K_3[Co(NO_2)_6]$(Indian Yellow; Fisher salt)	Yellow
$Cs_3[Co(NO_2)_6]$	Yellow
$Rb_3[Co(NO_2)_6]$	Yellow

$(NH_4)_3[Co(NO_2)_6]$	Yellow
$(NH_4)_3PO_4.12MoO_3$	Canary Yellow
$(NH_4)_3AsO_4.12MoO_3$	Canary Yellow
$KMnO_4$	Pink
$NaMnO_4$	Pink
$HMnO_4$	Pink
$Mn(OH)_2$	Pink
$CoCl_2.2H_2O$	Pink
$(NH_4)_2SnCl_6$ (Mordant; Pink salt)	Pink
Na_2MnO_4	Green
$Co(CN)_2$	Buff
MnS	Buff
$Fe(SCN)_3$ (ppt.)	Blood red
$Fe(CH_3COO)_3$	Blood red
CrO_2Cl_2 (Fumes)	Red
Cu_2C_2 (Explosive)	Red
$[Cu(NH_3)_4]SO_4$ (Switzer's reagent)	Dark Blue
$CuHAsO_3$ (Scheel's green)	Green
$FeSO_4.NO$ (Brown ring)	Brown
$[Fe(H_2O)_5NO]SO_4$ (Brown complex)	Brown
$Na_4[Fe(CN)_5NOS]$	Purple
BiOI	Orange
$Hg<^{NH_2}_{O}>Hg<_{I}$	Brown
$Hg<^{NH_2}_{Cl}$	White
$Hg<^{NH_2}_{Cl}.Hg$	Black

COLOUR OF COMPOUNDS

$ZnSO_4.7H_2O$ (white vitriol)	White
$CaSO_4.1/2H_2O$ (Plaster of paris)	White
$CuSO_4.5H_2O$ (Blue vitriol)	Blue
$FeSO_4.7H_2O$ (Green vitriol)	Green

HYDROXIDES

$Fe(OH)_3$	Red Brown
$Cr(OH)_3$	Green
$Cu(OH)_2$	Blue
$Al(OH)_3$	White
$Zn(OH)_2$	White
$Pb(OH)_2$	White
$Pb(OH)_2.2PbCO_3$ (White lead)	White

CYNIDES

$Pb(CN)_2$	White
AgCN	White
$Cd(CN)_2$	White
$Zn(CN)_2$	White
$Hg.Hg(CN)_2$	Black
$Co(CN)_2$	Buff
$Cu(CN)_2$	Pale Yellow
$Fe(CN)_2$	Yellow Brown
$Ni(CN)_2$	Green

Cr^{+3}

$Cr(OH)_3$	Green
$Cr_2(SO_4)_3$	Green
$CrCl_3$	Green