ORGANOMETALLICS Organometallic compde are those compounds which contain at le last one carbon-metal bond. This carbon atom belong to organic group. e.g. -c- Metal CH-Li methyl lithlum - 5-12- Metal CH3-Mg-I Methyl magnisium i odide (CHSCH) Pb Tetraethyl lead Ti Cly+A(SHS)3 Zeigler Natta catalyst - (5/5), Fe ferrocene ce To OSMS) APISMS K [Ptol3 (SH4)] Zeise sall PREPARATION OF ORGANOMETALLICE ;-(i) Some organometallic compde are prepared from respective alkyl or anyl hydrocarbons in ether kolvent.

CH5Br +Mg ether > CH5Mg Br

Ethyl mag. bromide (Grignard)

ethyl bromide ether and 7.7 CH I + Zm ethers et Zn I methyl zime lodible methyl iodide EHSBY + 2 Li ether EHSLi + libr Phonyl chloride Phonyl lithium directly (ii) Some Alkynes, react with alkalimetals to give organometalliz compds. erg. R-C=C-H + Na 370K R-C=C-Na + 12th sod. alkynide adkyl acetylene GRIGNARDS REAGENT Of all the organometallic compds known, organomagnisium (King x) or Grignard reagent are the most important. They are so named after Victor Grignard, who discovered and developed Their use as synthetic reagents. Almost all classes of organic compde can be prepared from them. Synthetic applications of Grignard's reagents! is Synthesis of alkanes by heating of Grignard's reagent with water, also hol and armines for eng. RX + mg duethyl RMgX alhylorough o. why Etzo reg. for prepriet for the for wallen X > I, Br, c) and Etzo is an exp good solvent for the for wallen of a R. secos ethere are non-acidic raproted. water Lateolits would his tomb - I thus distroy

mothers of OH CH3-Mg-I + HO methyl mag. I odide SM5-Mg-I + SMSOH -> SH6 + Mg 15 Ethyl mag. Iodide ethanol ethane CH3-Mg-I + GH5NH2 - CH4 + Mg I (ii) Higher alkanes are obtained when Grignand reagent is treated with alkyl halide for eig .

ch-8+

ch-8+

ch-8+

ch-6+

ethyl iodide propane -> CH3-C2H5 + Mg I 2 (iii) Synthesis of alkenes by the action of unsaturated halides oh G.R. For eig CH3-Mg-Br + Breych=cH2 -> CH3-CH3-CH3 + Mg Br2 1- butene alkyl bromide (iv) Synthesis of alkynes by treating alkyl habide with GR. The product is higher alkyne for e.g. CH3CECH + CH3 Mg I -> CH3C = C-Mg I + CH4 → etge=c-cHg + MgI2 CH3: C= C-MgI+ CH3 -2-butyne (higher alkyne) (v) Synthesis of 1° alcohols by treating with formaldelight or etylere oxide [H-C-17] 40/H+ PH Lug] +10/H+ H-C-H+ Mg OH 8+ HEC-H+ CH3-MgI formaldeligal Additionproduct ethyl aleuhot runstable) -> [cng cng-cng-0 mg] TolHt cng cng cng on addition product 1 propanol (unstable) (10) +mg I (y) Synthesis of secondary alcohols: by the action of GiR. on aldelyde other than formaldelyde. For election of the the than formaldelyde. For election of the contract of t (H3-C-H + M9 OH acetaldehyde Isopropylaleohol addition product (unstable)

Synthesis of tertiary alcohols by the action of G.R. on ketone. -> [43-C=C43] HO/H+ CH3-C-CH3 +Mg OH + CHz - Mg -I Addition product (unstable) tertiany butyl aleohor (Viii) Synthesis of aldehydes by the action of G.R. with ethyl formale or hydrogen cyanide for e.g. of 192 7 11 - 144 + 49. +> cy - mg? -> [H-e-0545] Reary X H-C-0545 H-C= NMg] 2730/H+ H-C=0+NH3 - addition project frg I OH Constable hydrogen yande (ix) Synthesis of ethers (higher) by the action of Gik. on + 0 043 - 0 043 CH3 CH3 Mg Br (x) synthesis of kelones by treating G.R. with alky eyanide or cy-c=N +ocy-MgI -> [cy-c=NmgI] == cy-c=0 acetonitrile -+ (unstable) 0 + 6- 8+ cn3-6+ + cn3-mgI -> cy-C-cy + mg/I acetyl chloride Addition product Pore 9. 8+ CHI 8- C reacting with solid co_ (dry). (unstable ch-c-orde] to H T P CH-C-OH + Mg-1 CH3-MgI+ carbon di Oxide Additionproduct (constable)



synthesis of alleyl examide by interacting G. R. with chloramine. I sund of SM5 NH2 + Mg (I SM5 Mg I + NH cl -> SM5 NH + Mg (I)
chloraniere ethylamine cl Other organometallies by reacting with inorganic 4 SM5MgBr +2Pbc/ -> (SM5) 4Pb + Pb + 4 mg Br 4 ch MgI + sichy -> (eng) 4 + 4 Mg Cd Tetramethyl silane 2 SH5MgI + Hg C/2 -> (5,45) Hg + 2 Mg /C) Di Ethylmeren PApplications of organometallic compounds 1) Z.N. catalyst - [TiCly+(Ehs)Al] is used for prolymon of ethere and other alkene. (heterogeneous earlabyst). (2) Wilkinson's catalyst, as homo genous catalyst is used for selective hydrogenation of CEC (malkens) C=c +y (PPh3)3 RhCl H-C-d-H.
Benzene H-C-d-H. (3) TEL, (C, 45-)4Pb is used as an anti-knocking/ agent in petrol. (9) Organometallies like Ni'(CO)4, Mickel carbonyl is used in the purification of- Mickel by Mond's Process.

Organometallic compounds: CLASSIFICATION. Depending upon the nature of-c-M bond, organometallie compounds are of following types:-I-IONEC ORGANOMETALLIC COMPDS: - The organometallics in which the organic group (R) is bounded to highly electropositive metale like Na, ca etc. Such compas are colourless, salt like solids and are soluble in polar solvents. They are highly reactive and unstable with a short life. The organ compounds containing large cations (small polarizing power) and small carbanions (small polarisal lity) have maximum ionic character. e.g.Cstcy, Nat (csHs), Na+ (&Hs), etc, 2 - COMPOUNDS CONTAINING METAL CARBON SIGNABOND (Covalent): Metallic elements of groups 12, 13, 14, 15 and transition metals form o-bonded organometallies with carbon atoms. They further can be classified as! -(9)- organomet, compds of group-12 elements)
Ed: R2 Hg erg. (CH5)2 Hg R2 Zn erg. (CH5) Zn et. (b) Organomet compds of group-13 elements -> eig. (43) Tl, (695) 399 etc. (c) Organomet compels of-group- 14 elements > eg-Tetra ethyl lead (GH5)4Pb, (CH3)45i etc. (d) organomet compels of group-15 elements ->
eig. R3 P trialkyl/aryl prosprine
R3 As trialkyl/aryl Assine etc.

(e) Organomiel : compde of Transition nietals! Very few examples are known in which the oxidation state of metal is very low and it less near fire end of the transition serves. e.g. GHS-RH(NH3)5 , M-CEGR 3 - ORGANOMETALLICS WITH PI-BONDED LIGANDS: - This category michides organometallies of alkeires, alkyres and some other carbon containing compounds having es in their tt-mole culai organitale. L.g. ferrocene (bis-eyelopenta-Fe (5Hs) 2 or fe (75-5Hs)2

Hert (Pot tricklassolation) Cr (nº 6 hg)
Cr Dibenjene
Chromium - (Pot trichlorofethere)
- (Pot trichlorofethere)

Or K + (Pt 43 (17-644) Pt COH maneresents to no of c-atoms 4- YLIDES! - are organomet - compde in which metal is double bonded with the carbon at orn of the ligand.

Tig. Withing reagent PhyP=CH2 with consonion (-vely charged store) S- ORGANOMETALLICS WITH MULTICENTRE BONDS: - OL nonclassically bonded compounds:-organometallies which fall under-this category. eig . (Li° CH3)4, [Be (CH3)2]n, [Al (CH3)3]2 etc. In such compds, bonding can not be explained by the classical concepts of chemical bonding (i.e. by ionic or normal covalent bonding), therefore they and also called as Non-classifially bonded organismed Q, Whey Et20 (diethylether) is required for the preprior of assampledlies? And Et 0 is an exp very good solvent for the prepriet of G.R. because ethers are non-acidic (aprotic / contain no acidic H), therefore do not have any reaction with the G.R. formed. while solvents like 170 e alcohols are protect solvents i'e. they contain acidic. H, they H protonale the G.R. formed as - & form hydrocarbon. mucho- chy + Mg CoH 545- Mg-s + 5450H -> 546 + Mg/5

Structure LIAL HY Life Ht Al H > - letialredial arrangement of He around Al 3+ ar(Al Hy) ion - Hybridization of Al is sp3 hybd. - strong reducing agent. Synthesis By Lithium hydride & Aluminium hydride 4 LiH + Alda - LiAl Hy + 3 Lids Properties: - White coloured solid - should be placed in a dry place, because it widently react with water & release if gas. LO AL HY +4MO Note: Reactions must be carried out in Dry 2 îneil alm! Applications - O Formation of 1° & 2° alcohol -R=C-H LitAl Hy R-C-H .H30+ R-C-H (1° alcohol) al de tryde First these reactants - 2° R-C-R (2° alcohol) get converted to R-C-R (ii) aldelyde, then they Ketone get-converted to > R-C-H (1°) R-E-OR alcohols (iii)(Estás) R-C-H (1°) (1) 45 E-N/R GAHY (13-CH-N/H) (2° anul) R-6-019 finders-E-NCR LAH CHECKNER * R-E-H (1°) (Acid) (V) R- E- C1 (Acid chlorade) from (N) RNO2 3LIAHY, RNH2 Formation of Amines (i) R-C-NH2 BLIAHHY R CH3NH2 (1° annive) compat Nitrogompa (3 Fermation of Alkanes LIAPHY R CH NH2 (10) Rengel LiAlty Reng + Liel + Litty (IY) R-C=N (alkane) AlH3 Nitrile wayde BLIALHY , RNH2 (10) WR M3 azide