CONCEPT MAP GROUP 14: CARBON FAMILY (C, Si, Ge, Sn, Pb) Eletronic configuration: ns² np² Properties Carbon Silicon **Diamond** (strong C-C) $sp^3-sp^3\sigma$ bonds Allotropic forms SiCl • 3-Drigidnetwork Si (silica) Purest form and hardest • Silicones (containing Physical preperties Chemical properties Badconductor repeated R2SiO units ΔH_1 order: • $C & Si \rightarrow +4$ oxidation stats held by Si - O - Si C>Si>Ge>Sn>PbGe, Sn, Pb \rightarrow +2 and +4 (due Graphite (C-sp²) linkages. • C & Si → nonto inert pair effect) 2-D sheet (layered) structure, held Silicates • In $M^{2+} \rightarrow$ act as reducing metallic. by weak van der Waals forces Basic unit is SiO₄ Ge → metalloid agents Purest form Zeolites : 3-D alumino-Sn & Pb \rightarrow soft • $\ln M^{4+} \rightarrow \text{oxidising agents}$ Slippery, soft (lubricating agent) silicates metals All except C form $d\pi$ - $d\pi$ Good conductor (NaAlSi₂O₆·H₂O) More electrobonds Fullerene (bucky ball) negative and less \bullet C \rightarrow Due to absence of d- Large spheroidal molecules (C₆₀ metallic than grouporbitals, shows maximum or C_{70} coordination number 4. Si, Ge, Sn, Pb \rightarrow due to presence Oxides of d-orbitals shows 5 and 6 Anomalous behaviour CO → poisonous gas coordination number of carbon: Tetrahalides undergo CO₂ → greenhouse gas, non-Very hard hydrolysis and act as Lewis combustible, acidic Properties Higher melting point acids. CCl₄ is not hydrolysed. Diamond, graphite and fullerene Used in artificial respiration as and boiling point Reactivity: Form tetrahalides Maximum covalency carbogen (95% O₂ + 5% CO₂). → crystalline $(MX_4) \rightarrow \text{covalent (except)}$ of4 SnF₄ and PbF₄) • Forms $p\pi$ - $p\pi$ multiple • PbCl₄ \rightarrow stable carbon, lamp black → amorphous bonds $PbBr_4 \rightarrow unstable$ (microcrystalline carbons) Catenation Shows allotropic PbI₄ → unknown Charcoal → most reactive forms Diamond -> most resistant