TH-GC General Chemistry Week 20 2/16 Double Replacement Reactions Products Reactants after solvation

AB (ag) + CD (ag) \longrightarrow AD + CB

AB (B) + CB + DB \longrightarrow AD \bigcirc CBB

Cation anim cation anim ionic compounds raqueous environment "Nacl" - table salt water breaks dam and surrounds ion crystals -> solvating them # ,

Solubility Rules

Whether or not a reaction forms a precipitate is dictated by the solubility rules. These rules provide guidelines that tell which ions form solids and which remain in their ionic form in aqueous solution. The rules are to be followed from the top down, meaning that if something is insoluble (or soluble) due to rule 1, it has precedence over a higher-numbered rule.

- 1. Salts formed with group 1 cations and NH+4NH4+ cations are **soluble**. There are some exceptions for certain Li+Li+ salts.
- 2. Acetates (C₂H₃O₋₂C₂H₃O₂-), nitrates (NO₋₃NO₃-), and perchlorates (ClO₋₄ClO₄-) are **soluble**.
- 3. Bromides, chlorides, and iodides are soluble.
- 4. Sulfates (SO₂-4SO₄2-) are **soluble** with the exception of sulfates formed with Ca₂+Ca₂+, Sr₂+Sr₂+, and Ba₂+Ba₂+.
- Salts containing silver, lead, and mercury (I) are insoluble.
- 6. Carbonates (CO₂-3CO₃2-), phosphates (PO₃-4PO₄3-), sulfides, oxides, and hydroxides (OH-OH-) are **insoluble** Sulfides formed with group 2 cations and hydroxides formed with calcium, strontium, and barium are exceptions.

If the rules state that an ion is soluble, then it remains in its aqueous ion form. If an ion is insoluble based on the solubility rules, then it forms a solid with an ion from the other reactant. If all the ions in a reaction are shown to be soluble, then no precipitation reaction occurs.

Printiple

Single Replacement dissolved + ZLi Br (ag) -> PbBr2 +2LiNO Lithium Bromide Nitrate insoluble product.

⊕ ⊖ ⊕ ⊖ Mg Cl₂ (ag) + 2Na OH (ag) — +2 -1 +1 -1 Mg(OH)(6)+2NaCl (04) $Mg(OH)_2(S)$ ana $t+2CI^{O}$ $Mg^{+2} + 2CI^{-} + 2Na^{+} + 2OH^{\Theta} \rightarrow$ precipitate write net reaction, cancel spectator ins Mg+2+2CT + 2Na+20H0 -> Mg(OH)2(S) 2Na+2CT Mgt2+20H8 -> Mg COH), (S) Ag NO3 + Naclay) Ag Clay) + Na NO3 (ng)
insoluble -> (s)

NR 3 Callzago + 2Na3 PO4 cago Caz (PO4)260 6 Naclago 3 Ca+2 + 6 et + 6 Na + 2Po43 -> Ca3(PO4)2(s) + 6460 3 Ca+2 + 2 POy -3 (PO4)2 (PO4)2