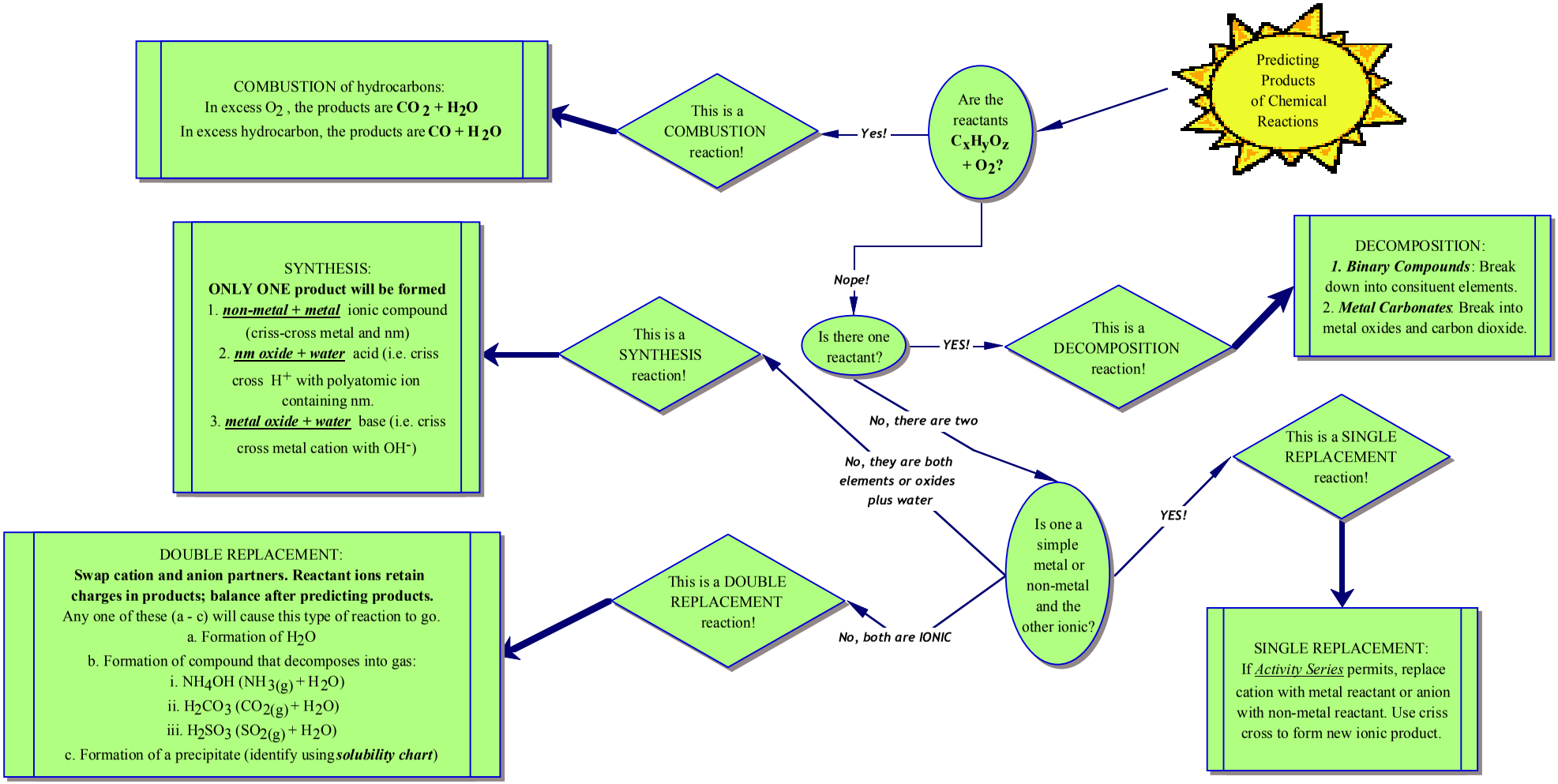
Predicting Products of Chemical Reactions
Are the reactants $C_xH_yO_z + O_2$?
Yes!
This is a COMBUSTION reaction!
COMBUSTION of hydrocarbons:
In excess O_2, the products are $CO_2 + H_2O$
In excess hydrocarbon, the products are $CO + H_2O$
Nope!
Is there one reactant?
YES!
This is a DECOMPOSITION reaction!
DECOMPOSITION:
1. Binary Compounds: Break down into consituent elements.
2. Metal Carbonates: Break into metal oxides and carbon dioxide.
No, there are two
Is one a simple metal or non-metal and the other ionic?
YES!
This is a SINGLE REPLACEMENT reaction!
SINGLE REPLACEMENT:
If Activity Series permits, replace cation with metal reactant or anion with non-metal reactant. Use criss cross to form new ionic product.
No, they are both elements or oxides plus water
This is a SYNTHESIS reaction!
SYNTHESIS:
ONLY ONE product will be formed
1. non-metal + metal ionic compound (criss-cross metal and nm)
2. nm oxide + water acid (i.e. criss cross H^+ with polyatomic ion containing nm.
3. metal oxide + water base (i.e. criss cross metal cation with OH^-)
No, both are IONIC
This is a DOUBLE REPLACEMENT reaction!
DOUBLE REPLACEMENT:
Swap cation and anion partners. Reactant ions retain charges in products; balance after predicting products.
Any one of these (a - c) will cause this type of reaction to go.
a. Formation of H_2O
b. Formation of compound that decomposes into gas:
i. NH_4OH ($NH_{3(g)} + H_2O$)
ii. H_2CO_3 ($CO_{2(g)} + H_2O$)
iii. H_2SO_3 ($SO_{2(g)} + H_2O$)
c. Formation of a precipitate (identify using solubility chart)