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Chemical Reactions

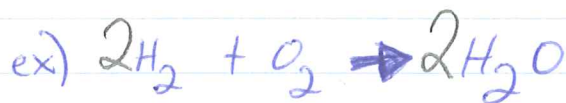
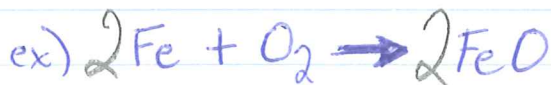
- We have discussed that chemical reactions occur when elements or compounds form or break bonds to create new substances.

- You can characterize each reaction based on what's occurring chemically into 1 of 5 types of chem. rxns.

- To do this you need to observe the reactants & products and determine if you are starting with elements or compound(s) and ending with elements or compound(s).

• Type 1 - synthesis/combination Rxn

- When 2 or more elements or compounds react to form 1 new compound.



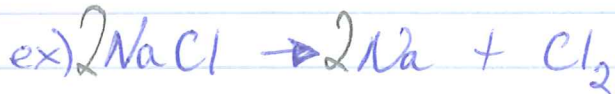
- Most are exothermic rxns, releasing energy to make product w/less energy than reactants.

• Type 2 - Decomposition Rxns

- Basically the reverse of a synthesis rxn.

- Usually, a single compound reactant "breaks down" into several products - either elements or new compounds.

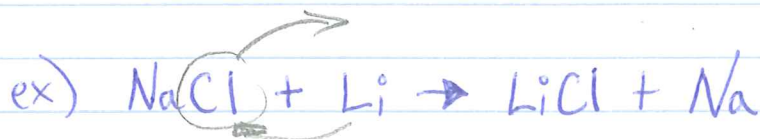
- Usually endothermic - absorbing energy into products - making more energy in products than reactants



* Many decomp rxns require heat or energy to "break down" reactant expressed as $\xrightarrow{\Delta}$ or $\xrightarrow{\text{Heat}}$

• Type 3 - Single Replacement Rxn

- An atom of one element (usually metal) replaces another from the reactant - like bumping someone out of line @ lunch



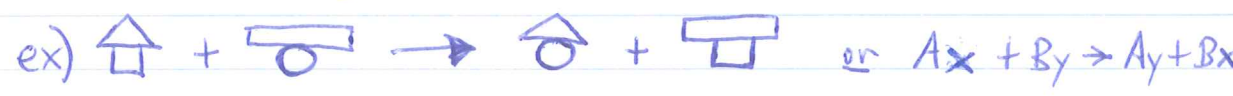
- A more active metal or atom must replace the less active one for S.R. to happen.

- If a less active metal is put into reaction nothing will happen.

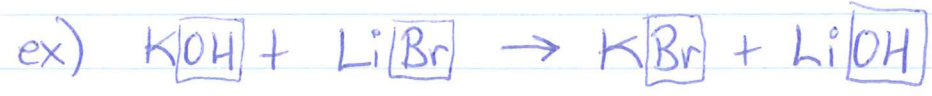
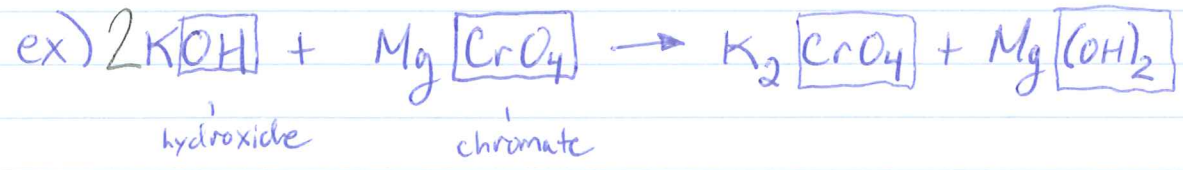
• Type 4 - Double Replacement Rxn

- As name implies - two atoms are exchanged between reactants to form 2 new products.

- Usually trading metals (ionic reactants)



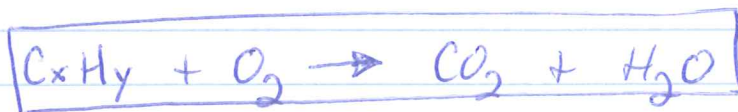
* Be careful when working with polyatomic ions as they behave just like a single atom in D.R. rxns



• Type 5 - Combustion Reactions

- Usually requires heat or flame in some way
- Occurs when oxygen reacts w/ another substance producing energy (heat or light) & CO₂ & H₂O.
- Most compounds that combust usually contain H & C.
- Elements that contain H & C & react w/ O₂ in combustion are called hydrocarbons

Combustion of hydrocarbons look like this :



examples of hydrocarbons are methane, ethane, propane, butane & pentane.

CH_4 C_2H_6 C_3H_8
 C_4H_{10} C_5H_{12}

