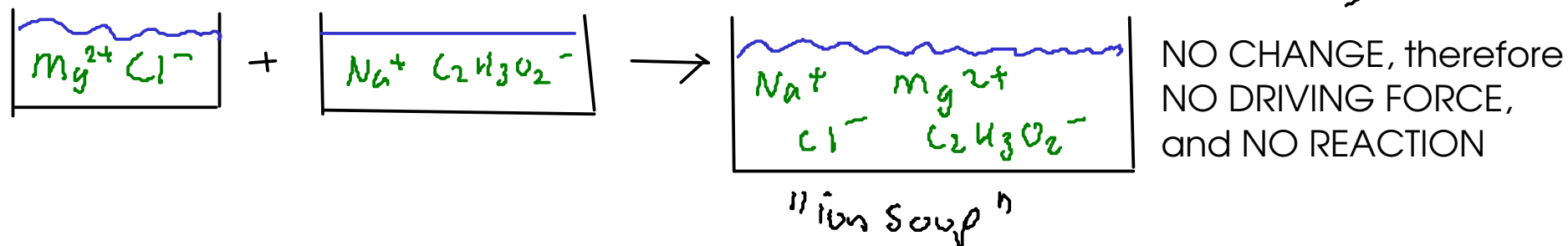


$\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$  ... dissolves in water

$\text{NaCl}$  ... dissolves in water

So, no solid forms here. All possible combinations of these four ions result in compounds that dissolve readily in water.



\* We will learn about other driving forces than the formation of solid, but these driving forces do not apply to this reaction



## ACIDS

- compounds that release hydrogen ion ( $H^+$ ), when dissolved in water.

### Properties of acids:

- Corrosive: React with most metals to give off hydrogen gas
- Cause chemical burns on contact
- Taste sour (like citrus - citric acid!)
- Changes litmus indicator to RED

## BASES

- Substances that release hydroxide ion ( $OH^-$ ) when dissolved in water

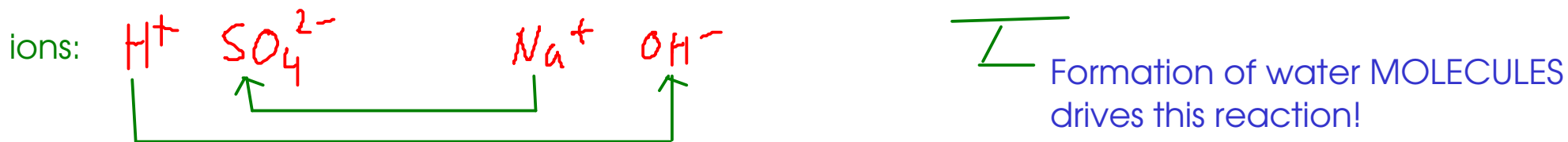
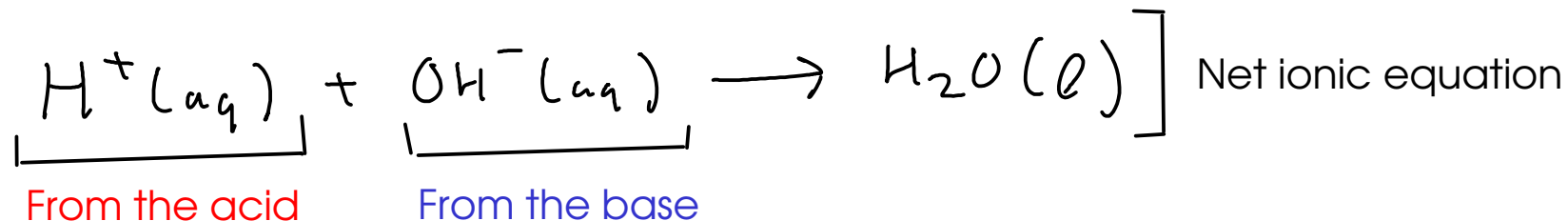
### Properties of bases:

- Caustic: Attack and dissolve organic matter (think lye, which is NaOH)
- Cause skin/eye damage on contact
- Taste bitter
- changes litmus indicator to BLUE

Due to the dissolving action of base on your skin, bases will feel "slippery". The base ITSELF is not particularly slippery, but what's left of your skin IS!

ACID/BASE or NEUTRALIZATION reactions continued

- the driving force of these reactions is the formation of water molecules.



- How can this reaction be detected?

- pH detector (indicator paper, etc.)
- do the products have similar chemical properties to the reactants?
- release of heat!

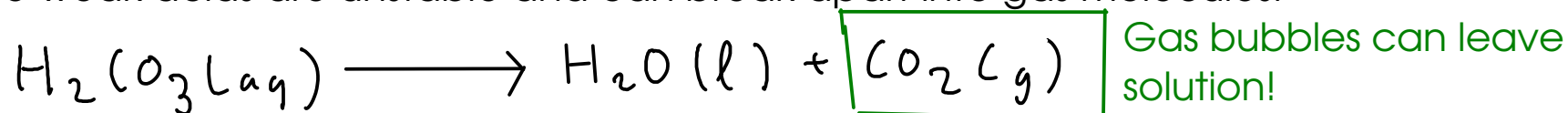
... formation of water is usually accompanied by a release of heat

## GAS FORMATION / OTHER MOLECULES

- There are a few other molecules that can be made with exchange-type chemistry.
- Most of these molecules are unstable and can break apart to form gases.

### - Formation of a weak acid:

- The formation of ANY weak acid in an exchange-type reaction can be a driving force.
- Some weak acids are unstable and can break apart into gas molecules.

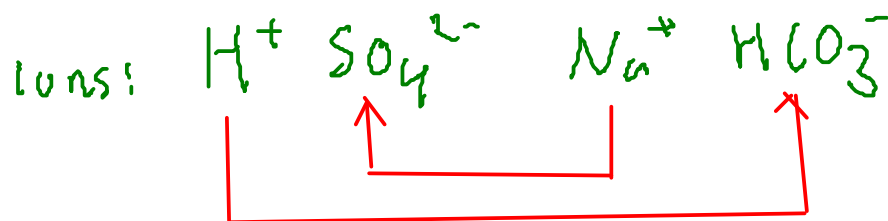
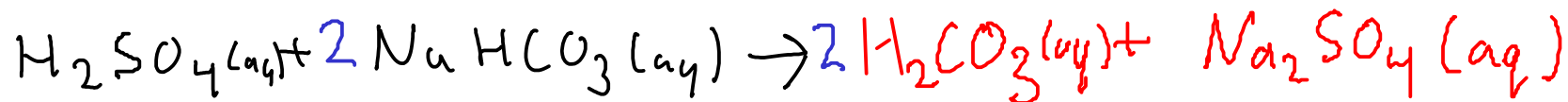


... but how would you form carbonic acid in an exchange-type reaction?

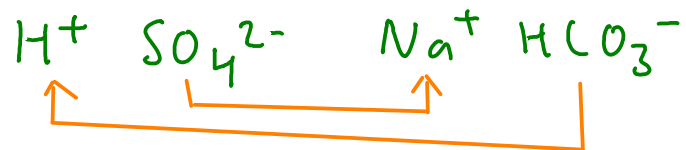
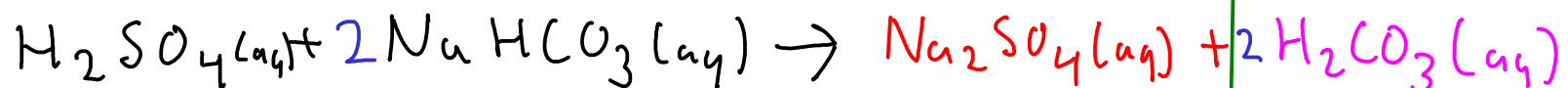
acid + carbonate  $\text{CO}_3^{2-}$

OR

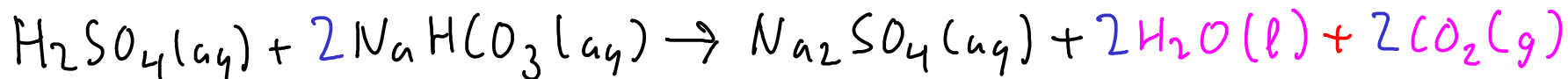
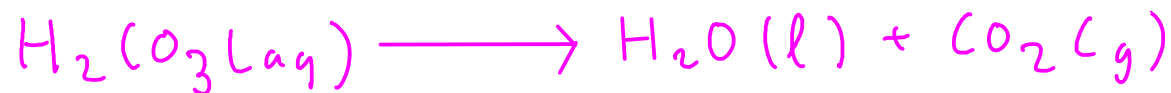
acid + bicarbonate  $\text{HCO}_3^-$



Formation of carbonic acid drives the reaction ... BUT ...

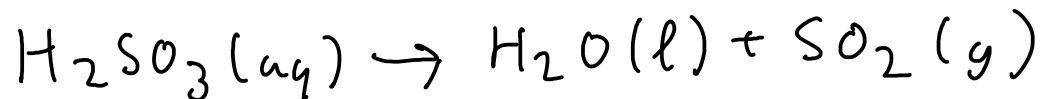


... but when we mix sulfuric acid and sodium bicarbonate, we observe BUBBLES. We need to write an equation that agrees with our observations. We know that carbonic acid decomposes, so we go ahead and put that into our equation.

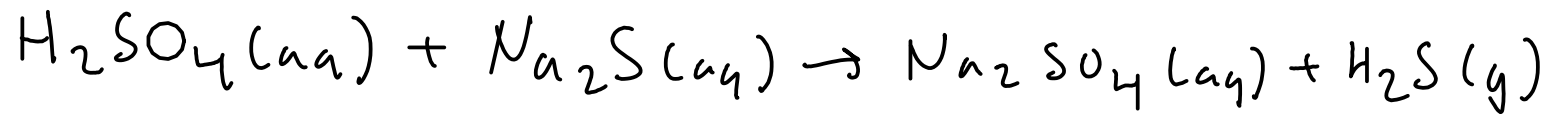


Other molecules of interest:

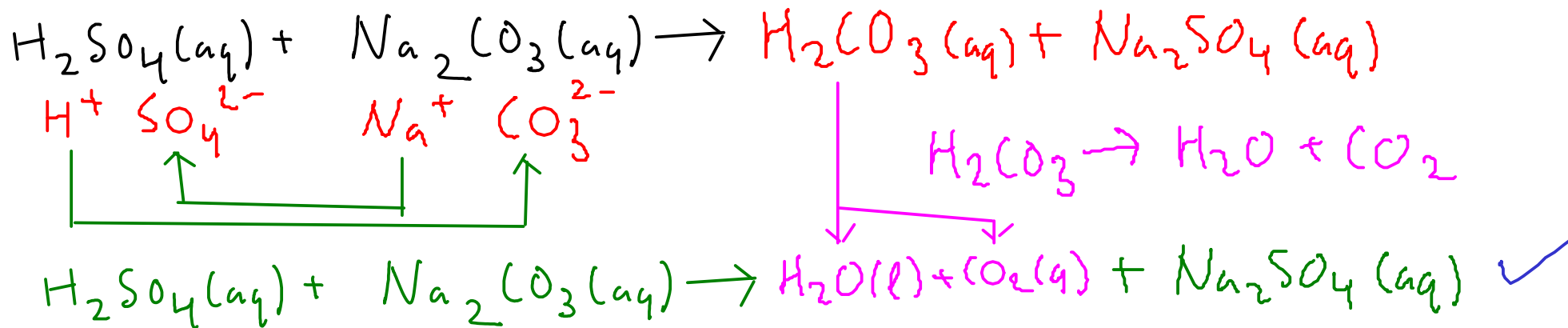
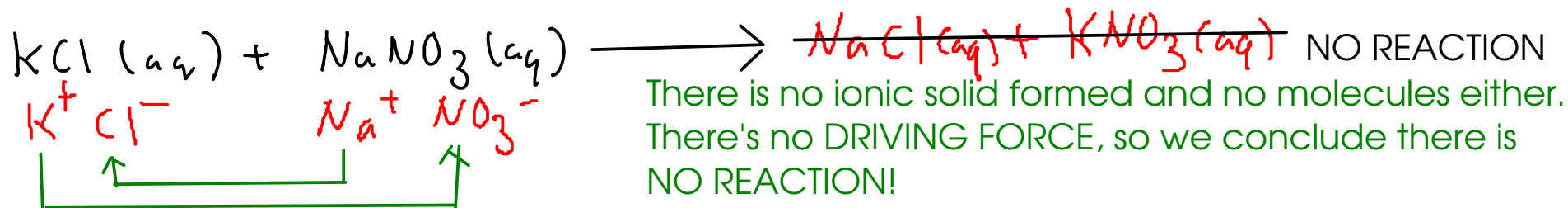
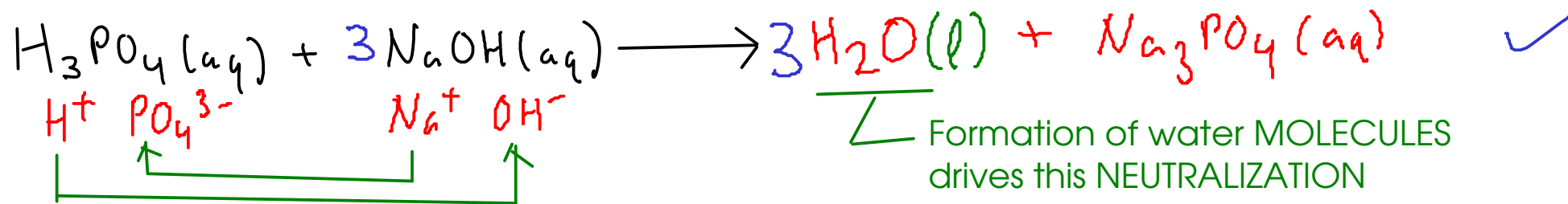
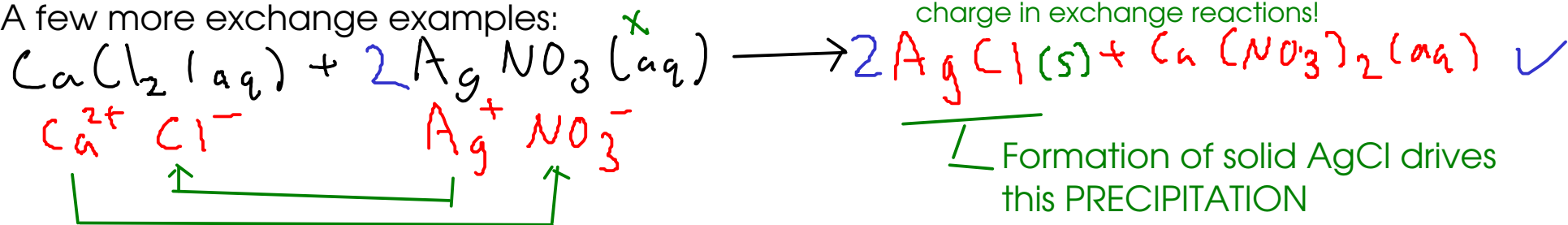
$\text{H}_2\text{SO}_3$  : sulfurous acid - React an ACID with a SULFITE



$\text{H}_2\text{S}$  : hydrogen sulfide (gas) - React an ACID with a SULFIDE



A few more exchange examples:



The formation of carbonic acid MOLECULES (and their decomposition to water and carbon dioxide gas) drives this reaction!

\* Transition metals DO NOT change their charge in exchange reactions!