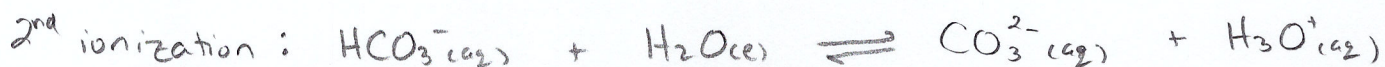
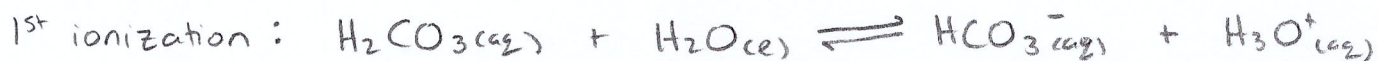


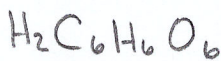
Amphoteric & Polyprotic Substances

- * A **polyprotic substance** is a chemical that has the ability to lose/gain more than one proton/hydrogen ion (H^+)
 - ↑ many
 - ↑ proton
 - ↑ acid
 - ↳ base
- * A polyprotic substance will only lose/gain one proton/hydrogen ion at a time
 - Consider the example of carbonic acid. Carbonic acid is diprotic, meaning it has two protons that can be donated



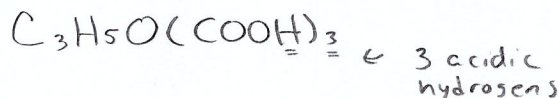
- Some organic acids can have several hydrogen atoms in the molecule, but not all of the hydrogen atoms will be acidic hydrogen ions. Acidic hydrogen ions are simply the hydrogen ions that can be lost in an acid-base reaction. In an organic acid, the acidic hydrogen ions are the ones attached in the $-COOH$ group and are usually found at the ends of the molecule (not the hydrogen atoms contained in the middle of the molecule).
 - Example:

Polyprotic



↑
2 acidic hydrogens

OR

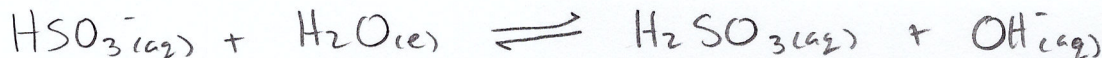
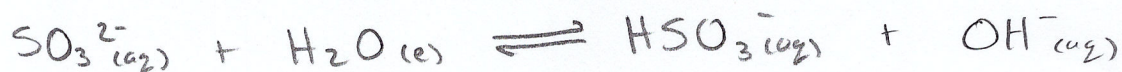


Not Polyprotic



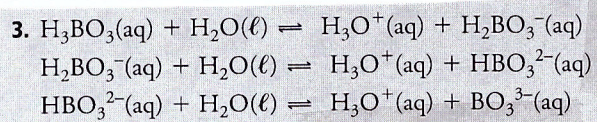
← only 1 acidic hydrogen

- Polyprotic bases usually have a negative charge that is less than -1 and can gain more than one hydrogen ion.
 - Example:
 - ↳ i.e. -2, -3, etc.

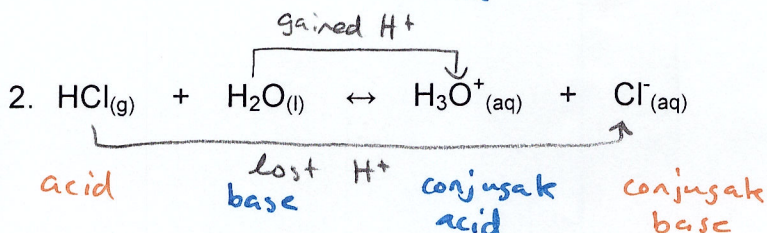
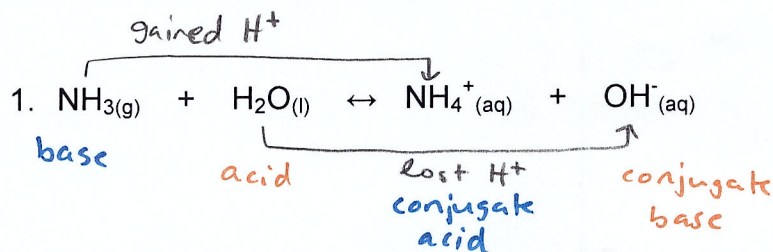


Section 17.2 Review Answers

Student Textbook page 690



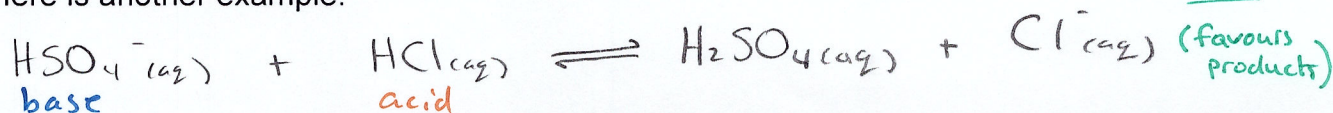
- Consider the following two reactions:



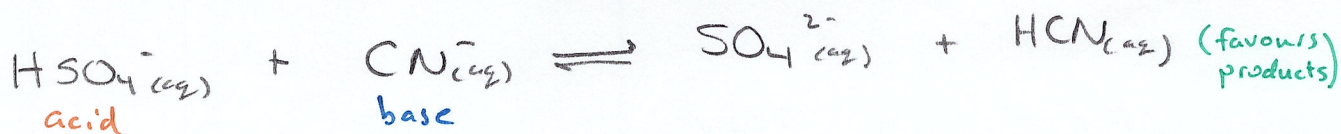
- What observations can you make between any similarities and differences?

in rxn #1, H₂O acts as an acid & in rxn #2, H₂O acts as a base

- A substance that can act as a base in one reaction and act as an acid in another reaction is called an **amphoteric substance** or **amphiprotic**
- Here is another example:



vs.



- Most amphoteric substances are a negatively charged ion that contains at least one acidic hydrogen (ie. HSO₄⁻(aq), HCO₃⁻(aq), H₂PO₄⁻(aq))
 - However, not all amphoteric substances fall into this category. An example includes water (H₂O), which can act as an acid and form OH⁻(aq) or water can act as a base and form H₃O⁺(aq). Another example is NH₃, which can act as a base and form NH₄⁺ or NH₃ can act as an acid and form NH₂⁻.
 - Check by looking on pg. 8-9 of data book to see if the chemical is found on both sides of the table

Now try pg. 688 # 5-7 & pg. 690 #3