

Chapter 14

Acids & Bases: The Theory

Acids & Bases Part 1: Introduction with Predicting the Products

Arrhenius Definition

Acids: substances that produce hydrogen ions (protons) when dissolved in H_2O

Bases: substances that produce hydroxide ions when dissolved in H_2O

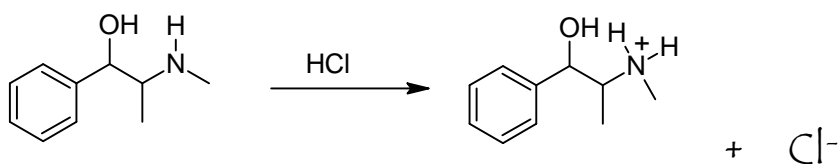
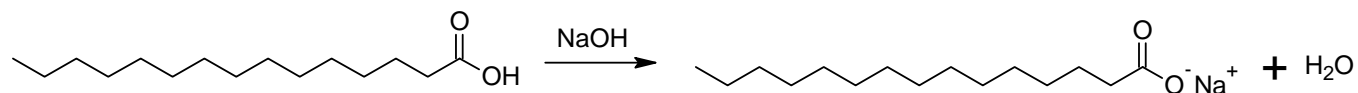
Bronsted-Lowry Definition

Acid:

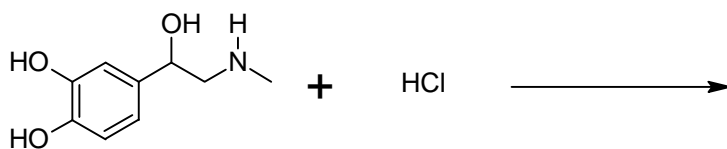
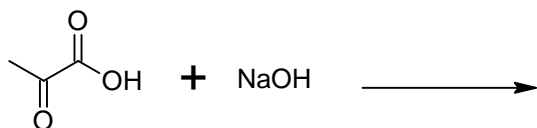
Base:

Label the reactants as "acid" or "base".

Look at the products and describe how they are different from the reactants.



Complete the acid-base reactions below.



Acids & Bases Part 2: Inorganic and Organic Acid Nomenclature

Naming Inorganic Acids

All acids have H^+ ions in common. It is the anions that differ.

Acid names are derived from the suffix of the anion name.
Look at the anions you have memorized.

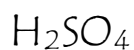
<u>Anion Name</u>	<u>Acid Name</u>
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_____ide anions	\Rightarrow	hydro_____ic acid
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_____ate anions	\Rightarrow	_____ic acid
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_____ite anions	\Rightarrow	_____ous acid
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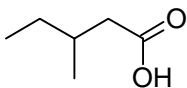
Exceptions:



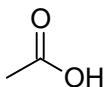
Naming Organic Acids

- Rule 1: Assign the root by finding the longest continuous carbon chain that contains the functional group.
- Rule 2: Assign the suffix by replacing "-ane" from homologous series with "-anoic acid".
- Rule 3: The locator number is NOT needed because the carboxylic acid is always at the end of the carbon chain.
- Rule 4: Assign a prefix if the main chain contains substituents.

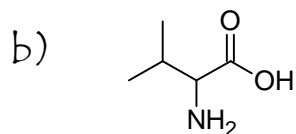
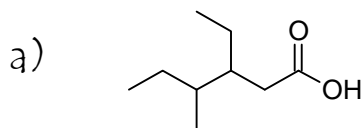
Example:



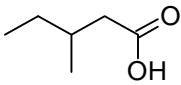
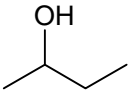
What is the common name of the following carboxylic acid?



Give the IUPAC name for the following compounds.



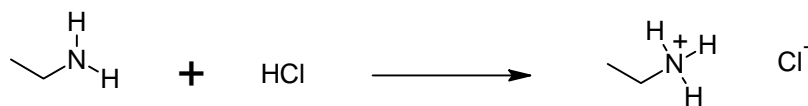
Name the following compounds and identify them as acidic, basic or neutral.

Compound	Name	Acid, Base or Neutral
FeCl_3		
		
BaBr_2		
H_2CO_3		
KOH		
		
$\text{CH}_3\text{CH}(\text{NH}_2)\text{CH}_3$		

Memorize the following five strong acids. What are their names?

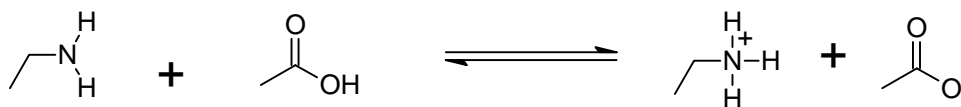
Chemical Formula	Anion Name	Chemical Name
HCl		
HBr		
HI		
HNO ₃		
H ₂ SO ₄		
HClO ₄	perchlorate	

Strong Acids react completely.



ALL other acids are weak acids.

Weak Acids do NOT react completely.



Acids & Bases Part 3: The Bronsted-Lowry Definition & Conjugate Acid-Base Pairs

Bronsted-Lowry Definition

Acid:

Base:

Implications of the Bronsted-Lowry definition:

1) Free H^+ does not actually exist in H_2O

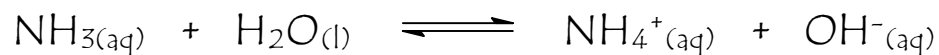
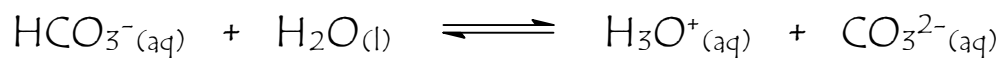
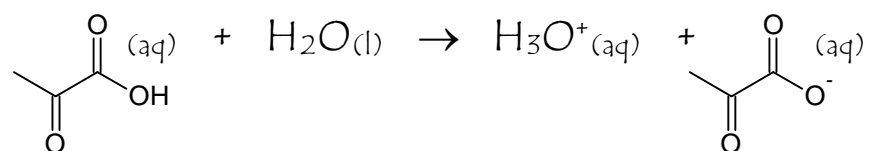
2) Reactions between an acid and base involve proton transfer.

Write the conjugate base for H_2CO_3 .

Write the conjugate acid for HS^- .

For each of the reactions below:

1. Label each reactant as an "acid" or "base".
2. Label each product as "conjugate base" or "conjugate acid".
3. Draw arrows to connect the conjugate acid-base pairs.



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