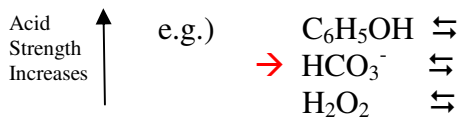


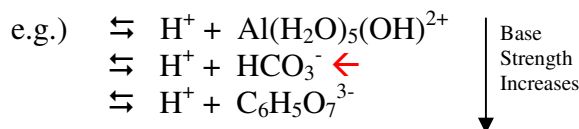
Amphiprotic Species (ions or molecules)

- are found on **both** sides of the table e.g.) HSO_4^-
- can act as acids (donate H^+ 's) or as bases (accept H^+ 's)
- to look at an amphiprotic species as an **acid**, you must find it on the **left** side:



HCO_3^- is a _____er acid than $\text{C}_6\text{H}_5\text{OH}$
 HCO_3^- is a _____er acid than H_2O_2

- to look at an amphiprotic species as a **base**, you must find it on the **right** side:
for HCO_3^- as a **base**:



HCO_3^- is a _____er base than $\text{C}_6\text{H}_5\text{O}_7^{3-}$
 HCO_3^- is a _____er base than $\text{Al}(\text{H}_2\text{O})_5(\text{OH})^{2+}$

HSO_4^- in shaded region on top right will **not** act as a base in water (Too weak of a base)

- However, it is **not** a spectator! (like NO_3^- is) Why not?

(HSO_4^- is also found on the left side quite a way up, it is a relatively “strong” weak *acid*.)

The Leveling Effect for Acids

What is $[\text{H}_3\text{O}^+]$ in 1.0 M H_3O^+ ? _____

What is $[\text{H}_3\text{O}^+]$ in 1.0 M HNO_3 ? _____

What is $[\text{H}_3\text{O}^+]$ in 1.0 M HCl ? _____

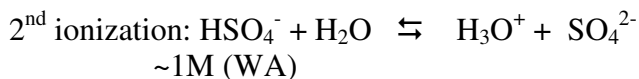
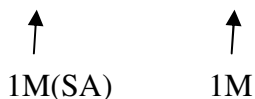
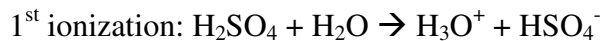
Acids from HClO_4 to H_2SO_4 are 100% ionized in water

\nearrow
only solvent used in Chem 12 (and most Chemistry)

- so even though HClO_4 is above HCl on the chart, it is no more acidic in a water solution. Therefore the top six strong acids have been levelled.

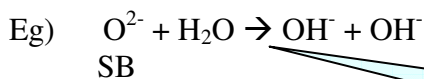
***H_3O^+ is the strongest acid that can exist in an undissociated form in water solution.
all stronger acids ionize to form H_3O^+***

(NOTE: although H₂SO₄ is diprotic, the H₃O⁺ produced from the second ionization is very little compared to that from the first)

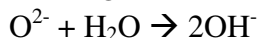


Leveling Affects of Bases

*The strongest base which can exist in high concentrations in water solution is OH⁻.
The two stronger bases below it will react with water completely to form OH⁻.*



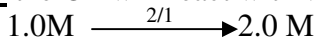
Or



Single
Arrow

What is the final [O²⁻] in 1.0 M Na₂O ? Answer: 0 M

- **All** the O²⁻ will react with water to form OH⁻



Write an equation for NH₂⁻ reacting with H₂O.

Answer: _____

Write out the definition of the levelling effect from page 125