

Acid Base Chemistry

1. Foundation knowledge

2. The pH scale

3. The pH of Water

4. Acids

a. Defining strong acids and weak acids

b. Strong acids

i. What makes a strong acid?

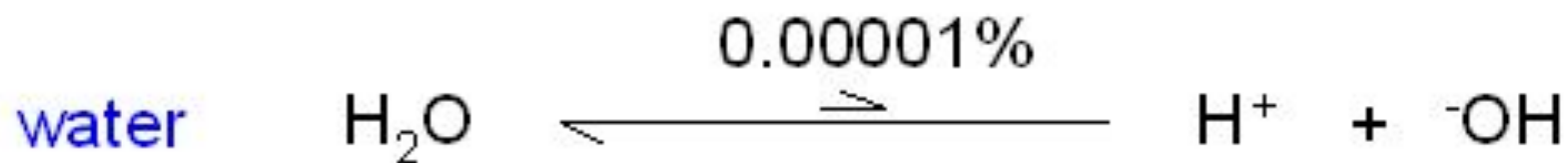
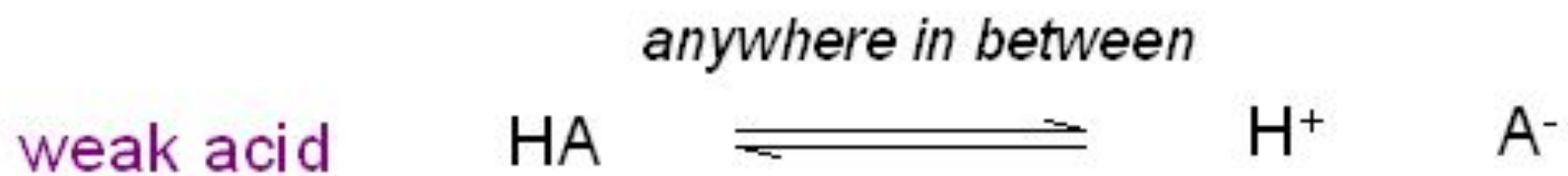
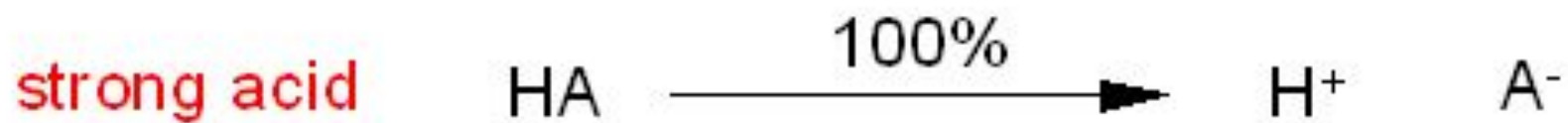
ii. How to calculate the pH of a strong acid

c. Weak acids

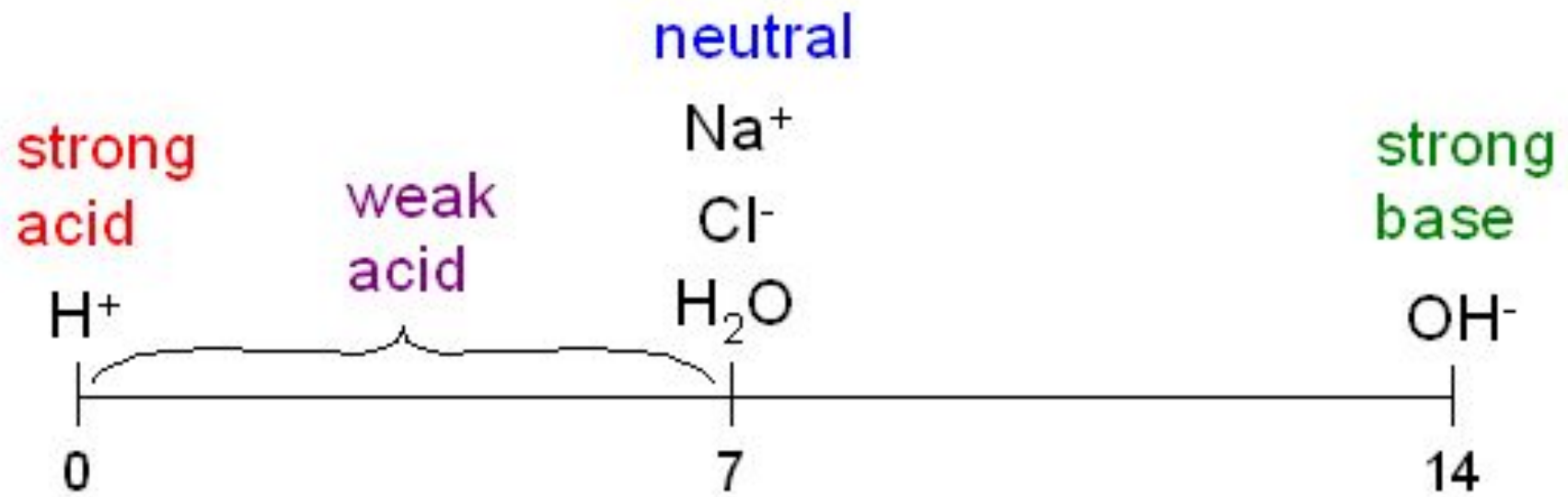
5. Bases

6. Acid base titrations

7. Relative acidity and basicity – competition for H^+



How does this fit on pH scale?



pH of 1mol dm^{-3} solutions

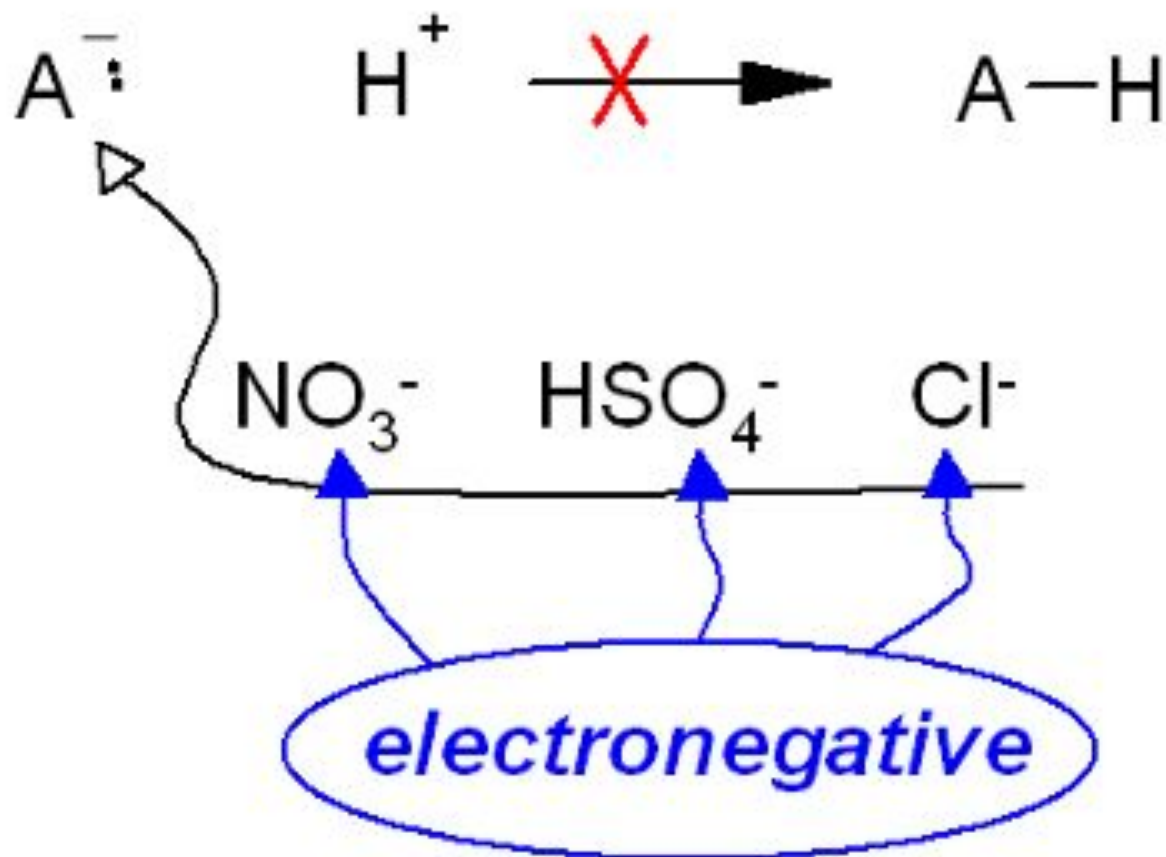
Define and Identify strong acids

nitric acid	H^+	NO_3^-	$\text{HNO}_3(\text{aq})$
sulphuric acid	H^+	HSO_4^-	$\text{H}_2\text{SO}_4(\text{aq})$
hydrochloric acid	H^+	Cl^-	$\text{HCl}(\text{aq})$

Stabilized anions

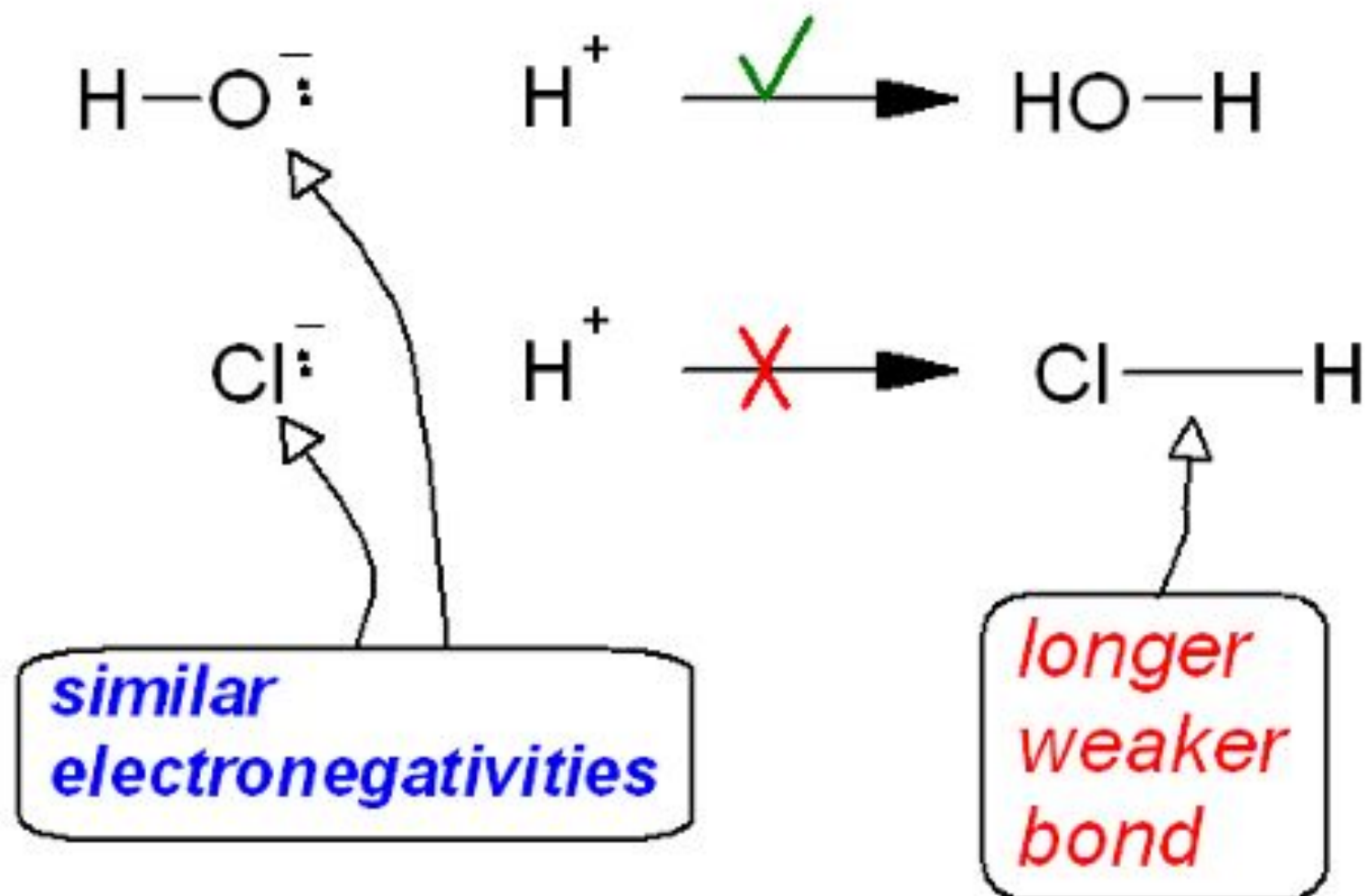
Strong acids

must have a stabilized anion

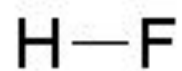
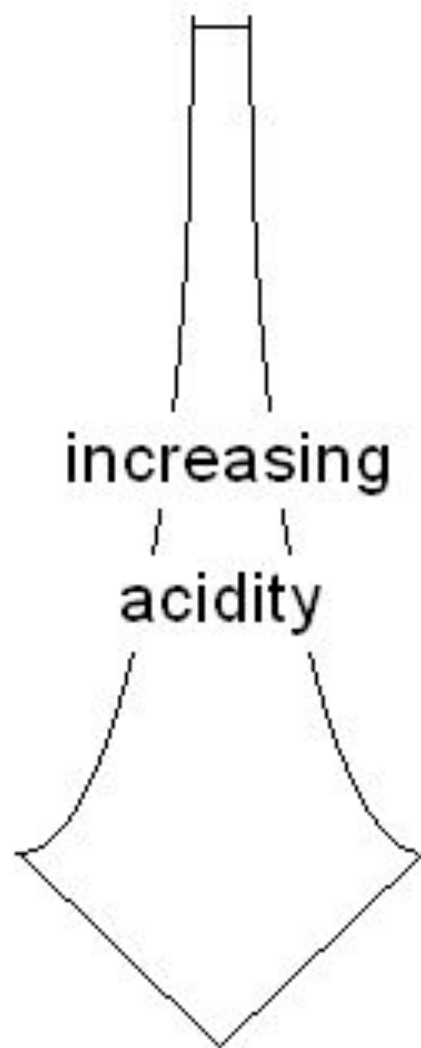


Strong acids

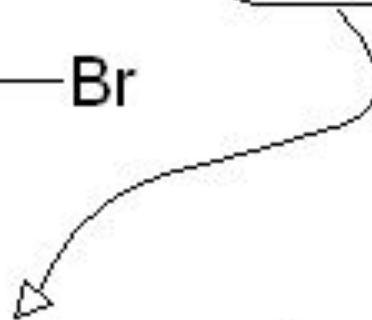
bond strength



bond strength



*longer
weaker
bond*

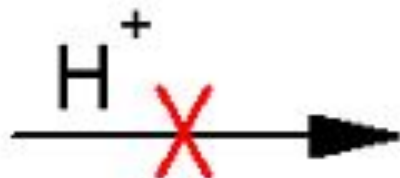


Why are some compounds acidic?

Strong acids

stabilized

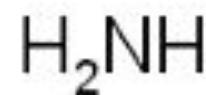
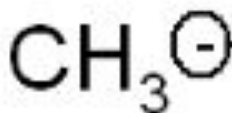
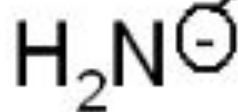
more than



less than

not so stabilized

Not acids



Calculate pH of strong acids

$$[\text{H}^+] = \text{acid concentration}$$

$$\text{pH} = -\log[\text{H}^+]$$

1 mol dm⁻³ HNO₃(aq)

$$[\text{H}^+] = 1 \text{ mol dm}^{-3}$$

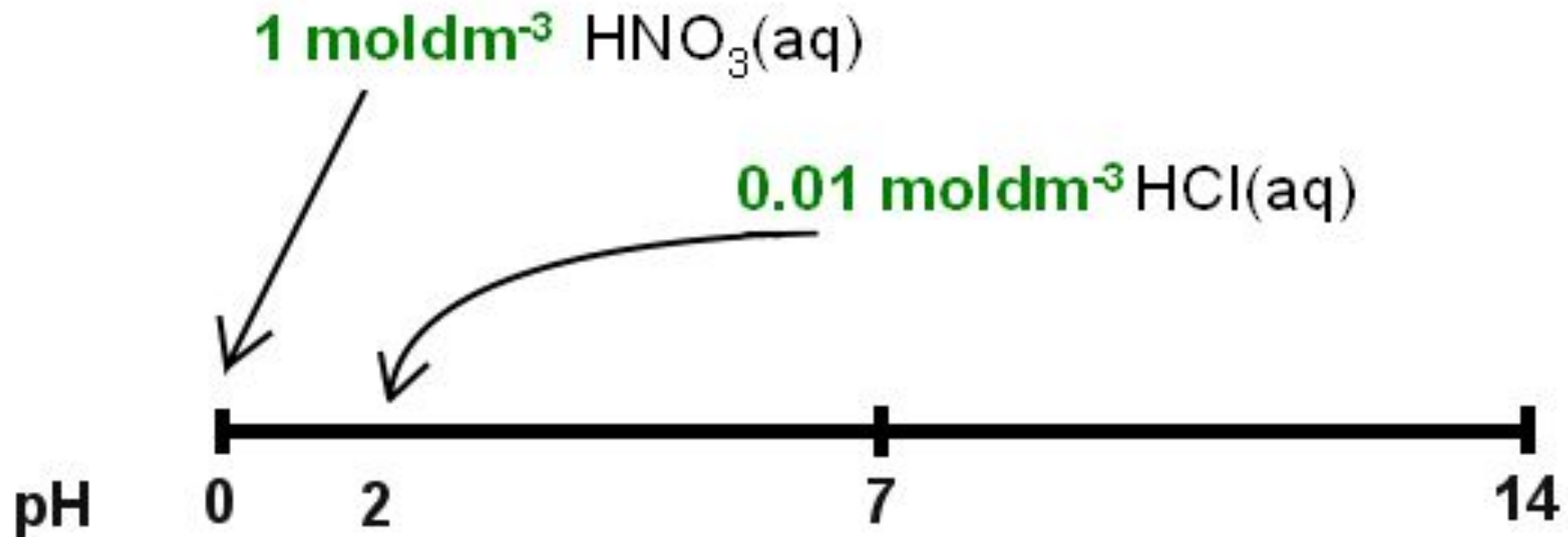
$$\text{pH} = -\log 1 = \underline{\underline{0}}$$

0.01 mol dm⁻³ HCl(aq)

$$[\text{H}^+] = 0.01 \text{ mol dm}^{-3}$$

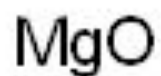
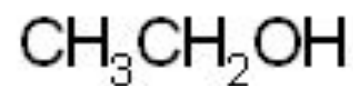
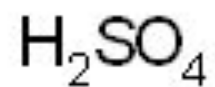
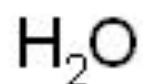
$$\text{pH} = -\log 0.01 = \underline{\underline{2}}$$

pH of strong acids

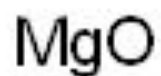
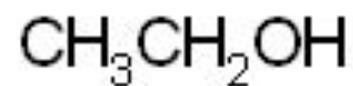
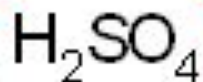
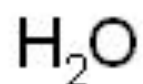


need concentration of acid

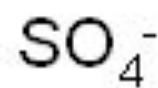
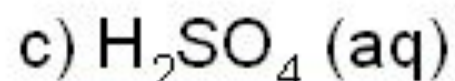
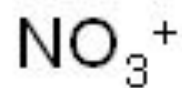
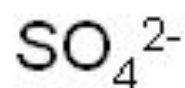
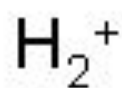
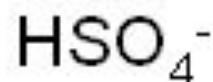
Identify the 3 strong acids



Identify the 3 strong acids

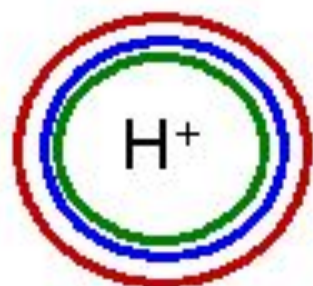


What ions are present in

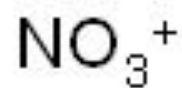
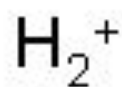


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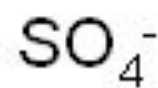
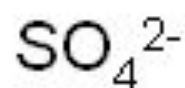
a) HCl (aq)



b) HNO₃ (aq)



c) H₂SO₄ (aq)



What do I need to work out the pH of a strong acid?

Definitely

Might be useful

Definitely not

Formula of
the acid

pK_a of the acid

concentration of
the acid

pK_w

volume of
solution

What do I need to work out the pH of a strong acid?

Definitely

Might be useful

Definitely not

Formula of
the acid

pK_a of the acid

concentration of
the acid

pK_w

volume of
solution

What do I need to work out the pH of a strong acid?

Definitely

Might be useful

Definitely not

Formula of
the acid

just to check it
is a strong acid!

pK_a of the acid

concentration of
the acid

we will assume this
is the H^+ concentration

pK_w

only need this for
working out pH of
bases

volume of
solution