

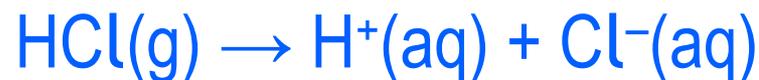
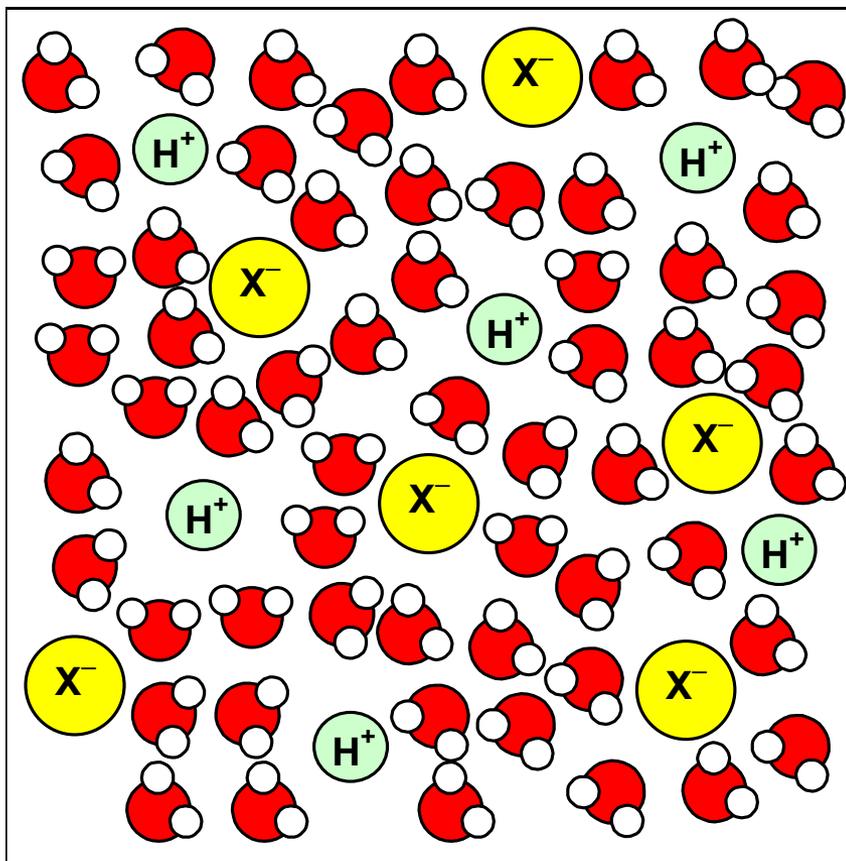


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# pH of STRONG ACIDS

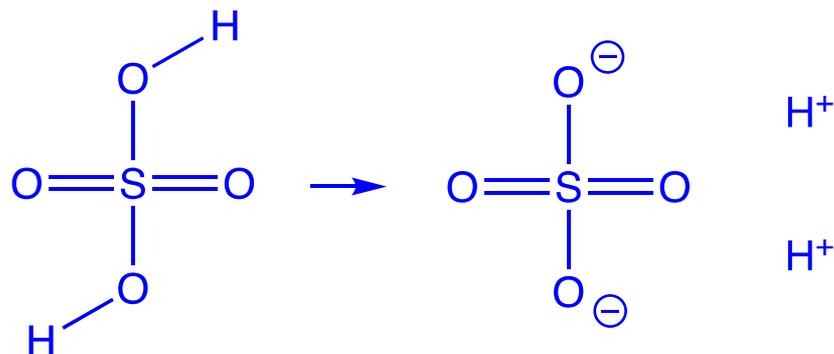
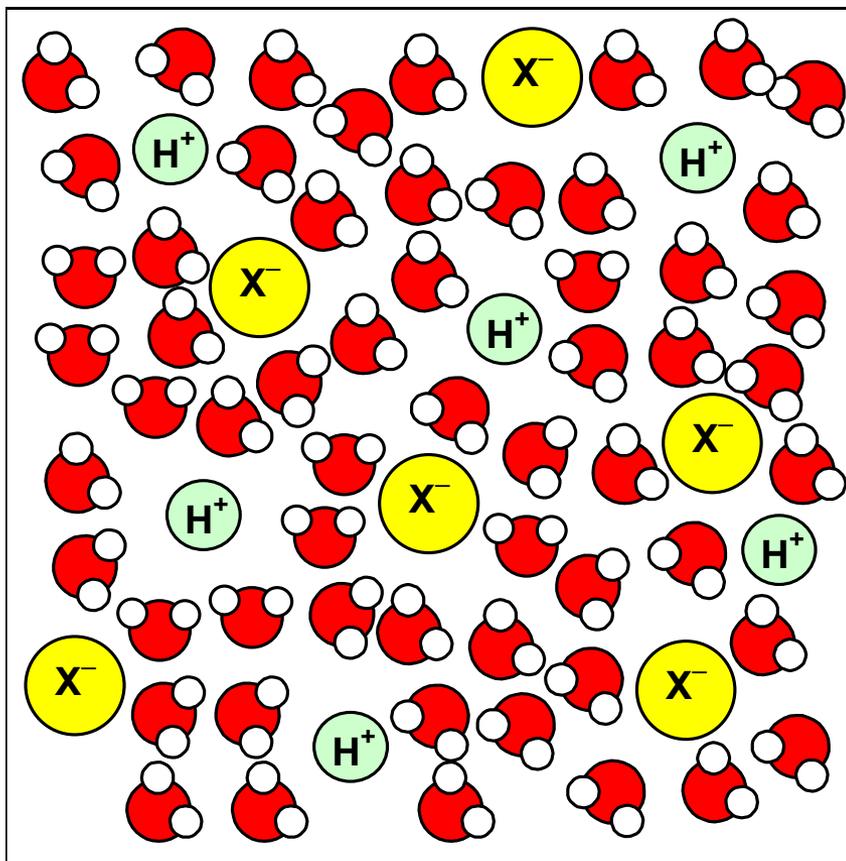
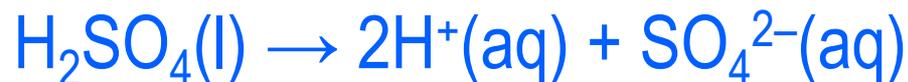
# WHAT IS AN ACID?

Substance that reacts with water to form  $\text{H}^+(\text{aq})$  ions



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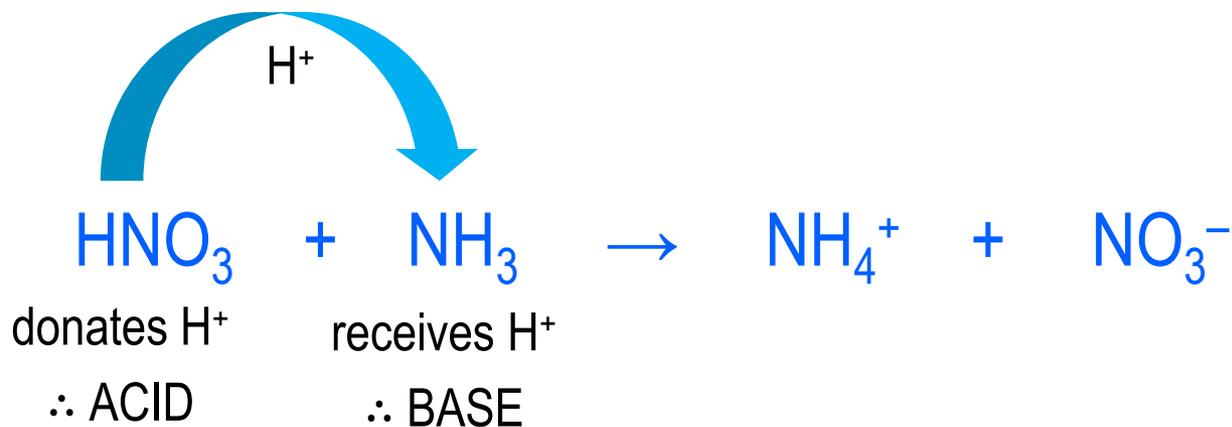
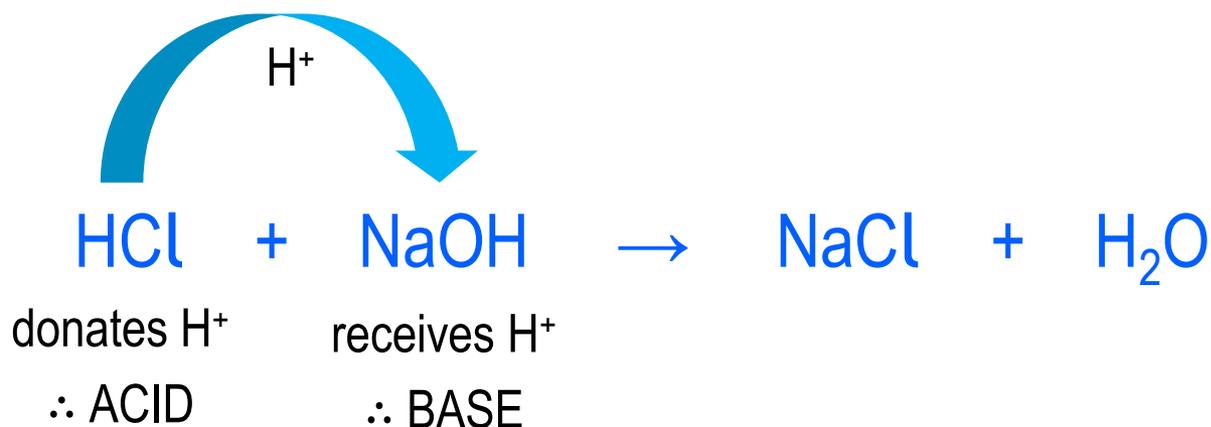
# H<sup>+</sup> in WATER

- H<sup>+</sup> ions are just a single proton so they are tiny and charged
- They do not exist on their own in water as they interact with H<sub>2</sub>O molecules (but in a complex way)
- This is sometimes simplified to H<sup>+</sup>(aq) or H<sub>3</sub>O<sup>+</sup>

# BRØNSTED-LOWRY ACIDS & BASES

ACID = proton donor

BASE = proton acceptor



# pH of STRONG ACIDS

pH is all about  $[H^+]$  ions

Monoprotic acids (one  $H^+$  from each molecule)



Diprotic acids (two  $H^+$  from each molecule)



# Logs (to the base 10)

Number		Log
1000	$10^3$	3
100	$10^2$	2
10	$10^1$	1
1	$10^0$	0
0.1	$10^{-1}$	-1
0.01	$10^{-2}$	-2
0.001	$10^{-3}$	-3

20	$10^{1.30}$	1.30
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0.006	$10^{-2.22}$	-2.22
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# pH of STRONG ACIDS

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

$$[\text{H}^+] = 10^{-\text{pH}}$$

always give pH to 2dp

0.500 mol dm<sup>-3</sup> HNO<sub>3</sub>

$$\text{pH} = -\log [\text{H}^+] = -\log 0.500 = \mathbf{0.30}$$

0.300 mol dm<sup>-3</sup> H<sub>2</sub>SO<sub>4</sub>

$$[\text{H}^+] = 2 \times 0.300 = 0.600$$

$$\text{pH} = -\log [\text{H}^+] = -\log 0.600 = \mathbf{0.22}$$

HCl pH 1.70

$$[\text{H}^+] = 10^{-\text{pH}} = 10^{-1.70} = 0.0200$$

$$[\text{HCl}] = \mathbf{0.0200 \text{ mol dm}^{-3}}$$

H<sub>2</sub>SO<sub>4</sub> pH 1.30

$$[\text{H}^+] = 10^{-\text{pH}} = 10^{-1.30} = 0.0501$$

$$[\text{H}_2\text{SO}_4] = \mathbf{0.0251 \text{ mol dm}^{-3}}$$

# pH of STRONG ACIDS

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

$$[\text{H}^+] = 10^{-\text{pH}}$$

Calculate the pH of the solution formed when 100 cm<sup>3</sup> of water is added to 50 cm<sup>3</sup> of 0.100 mol dm<sup>-3</sup> HNO<sub>3</sub>

$$\text{original } [\text{H}^+] = 0.100$$

$$\text{diluted } [\text{H}^+] = 0.100 \times \frac{50}{150} = 0.0333$$

$$\text{pH} = -\log [\text{H}^+] = -\log 0.0333 = 1.48$$

# pH of STRONG ACIDS

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

$$[\text{H}^+] = 10^{-\text{pH}}$$

Calculate the pH of the solution formed when 250 cm<sup>3</sup> of 0.300 mol dm<sup>-3</sup> H<sub>2</sub>SO<sub>4</sub> is made up to 2000 cm<sup>3</sup> solution with water

$$\text{original } [\text{H}^+] = 2 \times 0.300 = 0.600$$

$$\text{diluted } [\text{H}^+] = 0.600 \times \frac{250}{2000} = 0.0750$$

$$\text{pH} = -\log [\text{H}^+] = -\log 0.0750 = 1.12$$