

Acid Base Chemistry

1. Foundation knowledge

2. The pH scale

3. The pH of Water

4. Acids

5. Bases

a. Defining strong bases and weak bases

b. Strong bases

i. What makes a strong base?

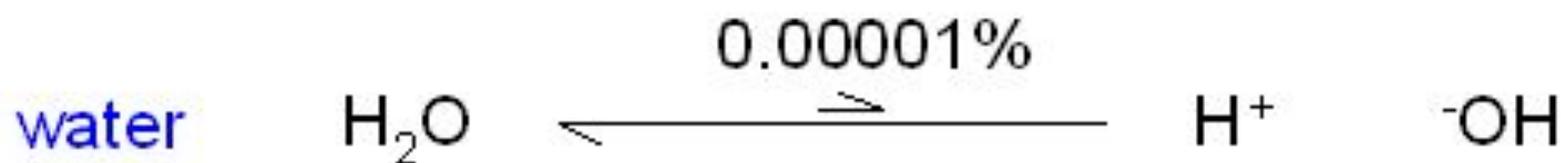
ii. How to calculate the pH of a strong base

c. Weak bases

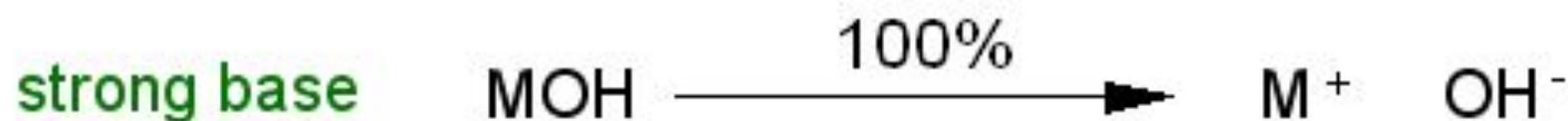
6. Acid base titrations

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

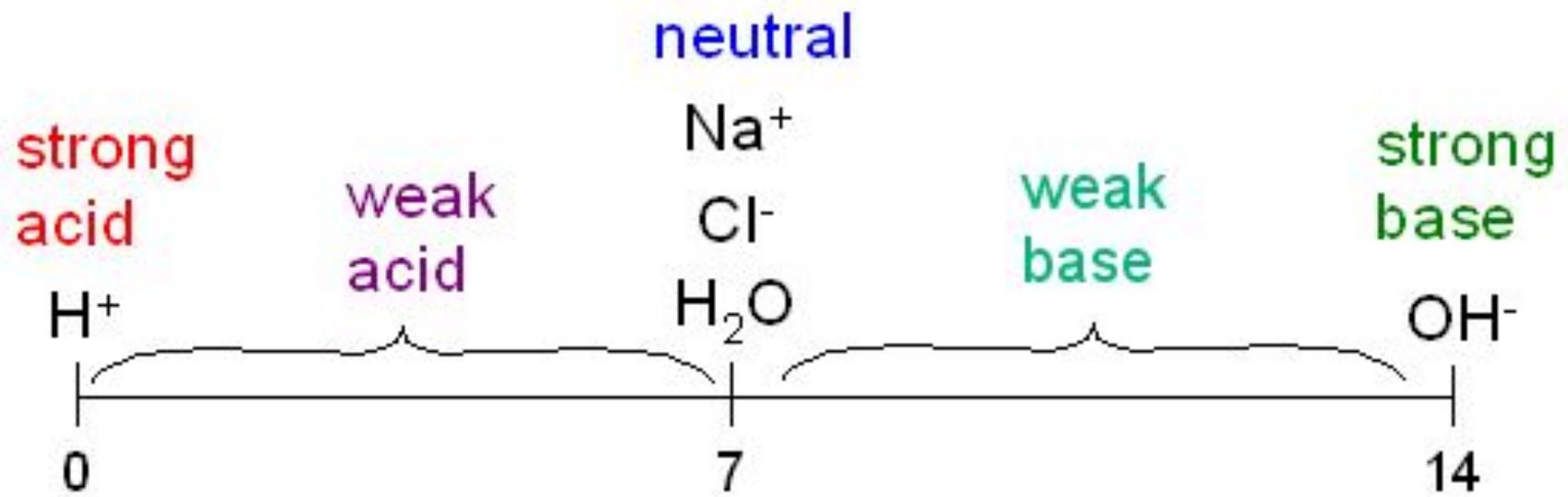
Strong bases and Weak bases



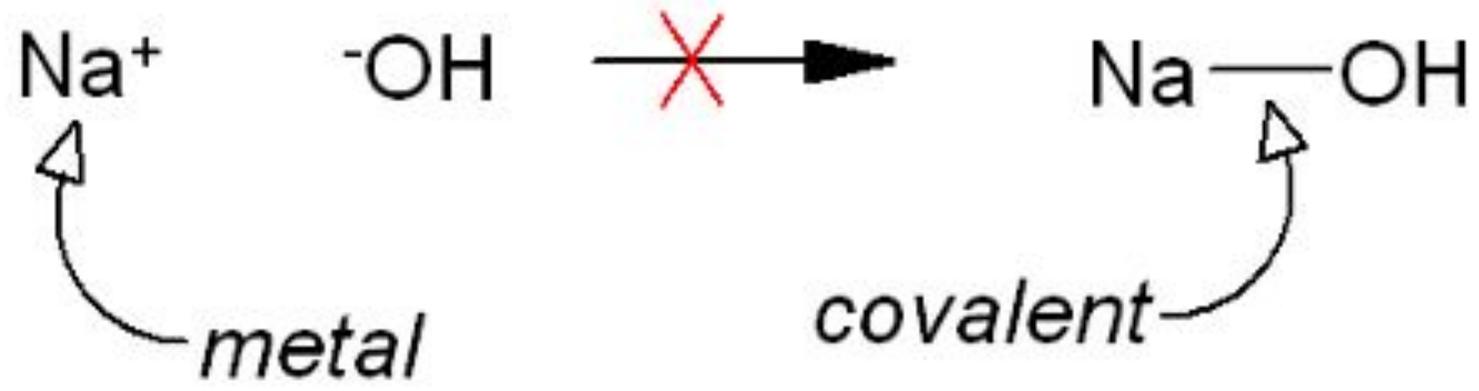
anywhere in between



How does this fit on pH scale?



pH of 1 mol dm⁻³ solutions



How do you calculate the pH of a strong base?

$$[\text{OH}^-] = \text{base concentration}$$

$$\text{pOH} = -\log[\text{OH}^-]$$

$$\text{pH} + \text{pOH} = 14$$

1 mol dm⁻³ KOH(aq)

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

$$\text{pOH} = -\log 1 = 0$$

$$\text{pH} = 14 - 0 = 14$$

How do you calculate the pH of a strong base?

$$[\text{OH}^-] = \text{base concentration}$$

$$\text{pOH} = -\log[\text{OH}^-]$$

$$\text{pH} + \text{pOH} = 14$$

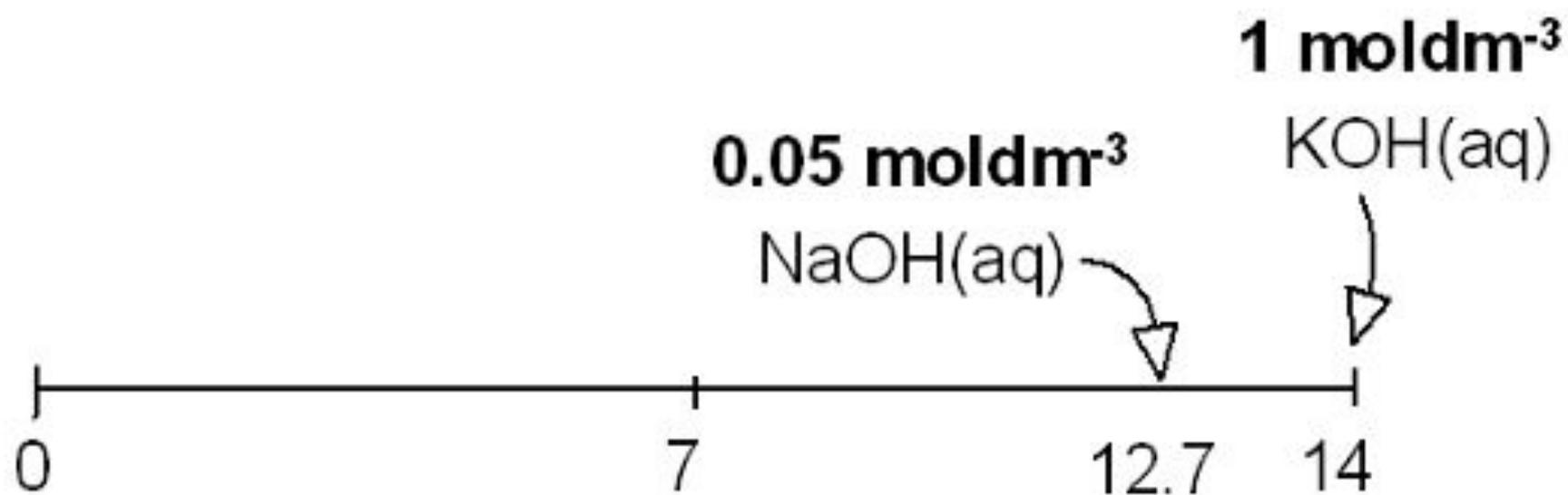
0.05 mol dm⁻³ NaOH(aq)

$$[\text{OH}^-] = 0.05 \text{ mol dm}^{-3}$$

$$\text{pOH} = -\log 0.05 = \mathbf{1.3}$$

$$\text{pH} = 14 - 1.3 = \underline{\underline{\mathbf{12.7}}}$$

pH of strong bases





$$\begin{aligned} K_w &= [\text{OH}^-][\text{H}^+] \\ &= 10^{-7} \times 10^{-7} \\ &= 10^{-14} \quad @298\text{K} \end{aligned}$$

$$\text{p}K_w = -\log 10^{-14} = 14$$

$$\begin{aligned} \text{p}K_w &= \text{p}([\text{OH}^-] \times [\text{H}^+]) \\ &= \text{pOH} + \text{pH} = \underline{\underline{14}} \end{aligned}$$

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

Definitely

Might be useful

Definitely not

Formula of
the base

pK_b of the base

concentration of
the base

pK_w

volume of
solution

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

Definitely

Might be useful

Definitely not

Formula of
the base

just to check it
is a strong base!

pK_b of the base

only need this
for weak bases

concentration of
the base

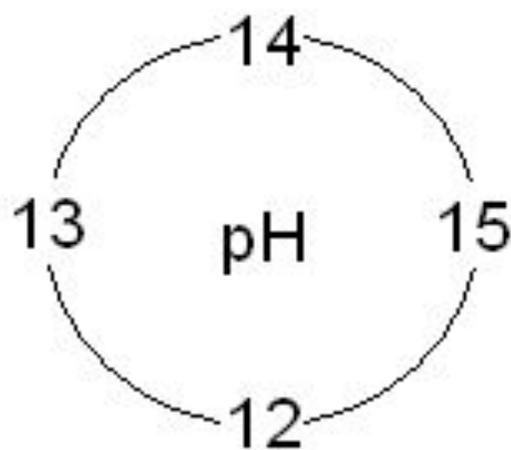
pK_w

volume of
solution

Match the correct pH to the following solutions:

1 mol dm⁻³
NaOH(aq)

0.1 mol dm⁻³
NaOH(aq)



10 mol dm⁻³
NaOH(aq)

0.01 mol dm⁻³
NaOH(aq)

Match the correct pH to the following solutions:

