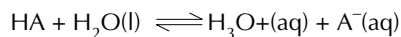


Explaining acid strength

One definition of an acid is that it dissolves in water to give hydrogen ions (H^+).

In fact the hydrogen ion (H^+) will associate with a water molecule to form H_3O^+ .

One way to write the equation for an acid 'HA' dissolving in water is:



The A in HA does not stand for a particular element, but for the 'acid radical' part of the molecule. So, for example, in hydrochloric acid 'HA' would be HCl, and 'A⁻' would be Cl⁻, whilst in ethanoic acid 'HA' would be CH₃COOH, and 'A⁻' would be CH₃COO⁻.

Acids (and alkalis) can be described as 'strong' or 'weak', and as 'concentrated' or 'dilute'.

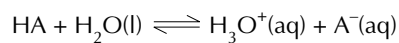
1. What is the difference between a strong acid and a weak acid?

2. What is the difference between a concentrated acid and a dilute acid?

3. If you could see the particles (molecules, ions etc) in an acidic solution, how would you decide whether it was a solution of a strong acid or a solution of a weak acid?

Classifying acid solutions

One way to write the equation for an acid 'HA' dissolving in water is:

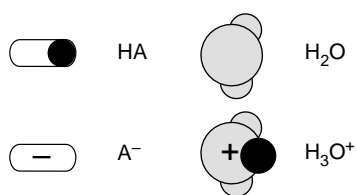


On the following pages are some diagrams of acidic solutions.

Scientific diagrams are always simplifications designed to highlight some aspects of the system represented. The diagrams in this exercise show simplifications of real solutions.

For example, the concentration of acids varies over many orders of magnitude, and an accurate diagram of a very dilute solution would need to show many thousands of water molecules for each $\text{H}^+(\text{aq})$ ion.

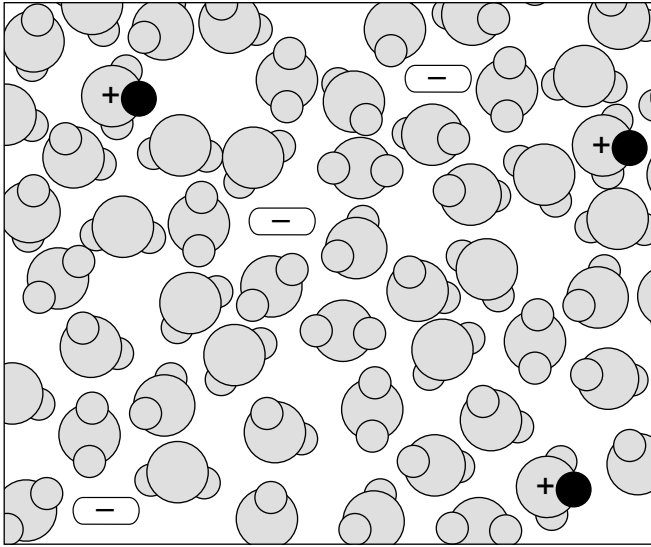
Only four types of particle are shown in these diagrams. The following key is used to distinguish between the different particles:



The size (and shape) of acid molecules varies greatly, and they are often much larger than a water molecule.

Look carefully at the four diagrams on the following pages, and see if you can tell what the differences between them are meant to indicate.

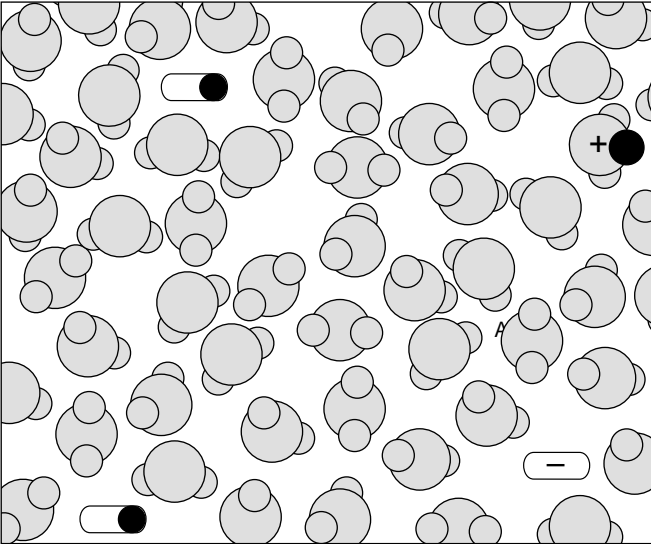
Diagram 1



1. What types of particles are shown in the solution represented in this diagram?

2. How would you describe this solution?

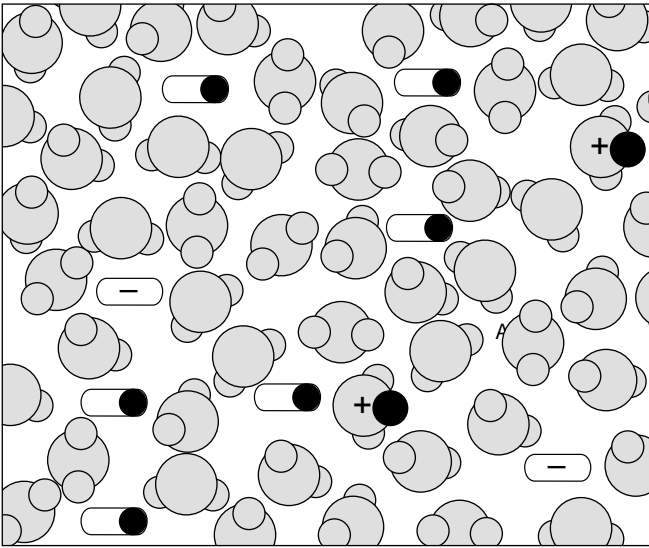
Diagram 2



3. What types of particles are shown in the solution represented in this diagram?

4. How would you describe this solution (compared to diagram 1)?

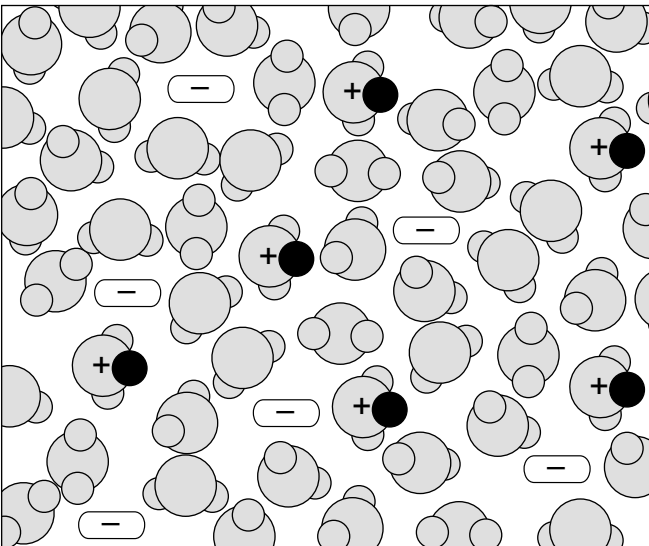
Diagram 3



5. What types of particles are shown in the solution represented in this diagram?

6. How would you describe this solution (compared to diagrams 1 and 2)?

Diagram 4

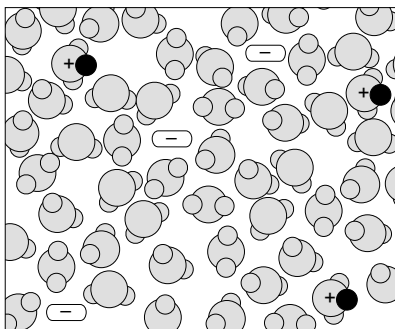


7. What types of particles are shown in the solution represented in this diagram?

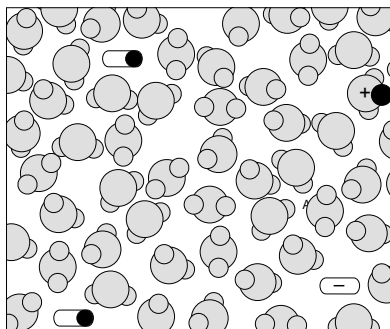
8. How would you describe this solution (compared to diagrams 1-3)?

9. The four diagrams you were asked to consider are reproduced in miniature below.

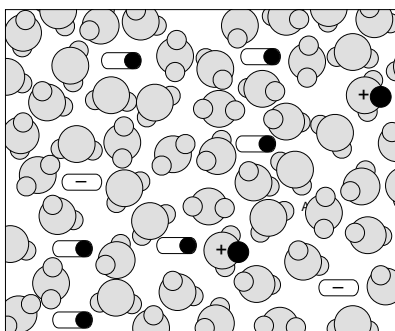
1.



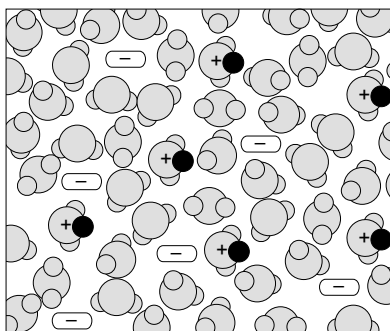
2.



3.



4.



The diagrams are meant to represent a concentrated solution of a strong acid, a dilute solution of a strong acid, a concentrated solution of a weak acid and a dilute solution of a weak acid. Use the table below to show which diagram is meant to represent each of the four solutions – write the number of the appropriate diagram in each box.

	Strong	Weak
Concentrated		
Dilute		