Acids and bases: knowledge check

1.1 Label this diagram of the pH scale using the words below to show the pH of:

(a) an acidic solution
(b) an alkaline solution
(c) a neutral solution.

\[
\begin{array}{cccccccccccc}
\text{acidic} & \text{alkaline} & \text{neutral} \\
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14 \\
\end{array}
\]

1.2 Use the words to complete the sentences.

(a) The pH scale measures the ________________________ or ________________________ of a solution.

(b) ________________________ solutions have a pH less than 7.

(c) ________________________ solutions have a pH of 7.

(d) ________________________ solutions have a pH greater than 7.
1.3 Use the words to complete the sentences.

- **hydrochloric acid**  
- **hydrogen**  
- **nitric acid**  
- **sodium hydroxide solution**  
- **sulfuric acid**

(a) Three acids commonly found in school laboratories are ____________________________, nitric acid and ____________________________.

(b) An alkali commonly found in school laboratories is ____________________________.

(c) ____________________________ ions are present in all acid solutions.

1.4 Use the words to complete the sentences. You can use the words more than once.

- **carbon dioxide**  
- **salt**  
- **water**

These general equations represent some methods used to make salts:

(a) acid + metal → ____________________________ + hydrogen

(b) acid + metal oxide → salt + ____________________________

(c) acid + metal hydroxide → salt + ____________________________

(d) acid + metal carbonate → salt + ____________________________ + ____________________________

1.5 Use the words to complete the sentences.

- **laundry detergent**  
- **lemon juice**

(a) Two everyday acids you might find in your home are vinegar and ____________________________.

(b) Two everyday bases you might find in your home are ____________________________ and baking soda.
Acids and bases: test myself

2.1 What is an indicator? Use the words to complete the sentence.

<table>
<thead>
<tr>
<th>colour</th>
<th>concentration</th>
<th>pH</th>
<th>strength</th>
</tr>
</thead>
</table>

An indicator is a substance that changes ___________________________ depending on the ___________________________ of the solution.

2.2 What colour is universal indicator in an acidic solution, an alkaline solution and a neutral solution? Use the words to complete the sentences.

| blue | green | red |

(a) Universal indicator is ________________ in an acidic solution.
(b) Universal indicator is ________________ in an alkaline solution.
(c) Universal indicator is ________________ in a neutral solution.

2.3 What colour is universal indicator in a solution with a pH of 1? Use the words to complete the sentence.

| blue | green | red |

Universal indicator is ________________ in a solution with a pH of 1.

2.4 What colour is the indicator litmus in acidic and alkaline solutions? Use the words to complete the sentence.

| blue | green | red | yellow |

Litmus indicator solution turns ________________ in acidic solutions and ________________ in alkaline solutions.
2.5 What is a base? Use the words to complete the sentences.

- copper oxide disappears reacts
- salt sugar water

A base is any substance that ________________ with an acid to form
a __________________ and __________________.
For example, __________________ is a base.

2.6 What is an alkali? Use the words to complete the sentences.

- acids bases pH sodium hydroxide

Alkalis are soluble __________________ and have a
____________________________ greater than 7. For example,
___________________________ is an alkali.

2.7 What type of reaction occurs when an acid reacts with an alkali? Use the words to complete the sentence.

- combustion conduction neutralisation

A _____________________ reaction occurs when an acid reacts with an
alkali.

2.8 What names are given to the types of salts formed in reactions with these acids? Use the words to complete the sentences.

- carbonates chlorides hydrates
- nitrates sulfates

(a) Hydrochloric acid produces _____________________.
(b) Sulfuric acid produces _____________________.
(c) Nitric acid produces _____________________.

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2.9 Name the salt made when copper oxide reacts with sulfuric acid. Use the words to complete the sentence.

| copper | copper hydroxide | copper sulfate |

The salt made when copper oxide reacts with sulfuric acid is ________________.

2.10 Draw lines to link the name of the acid with its formula.

(a) hydrochloric acid  \( \text{H}_2\text{SO}_4 \)
(b) sulfuric acid  \( \text{HNO}_3 \)
(c) nitric acid  \( \text{HCl} \)
Acids and bases: feeling confident?

3.1 Complete the word equations.

<table>
<thead>
<tr>
<th>acid</th>
<th>hydroxide</th>
<th>nitrate</th>
<th>sodium</th>
<th>sulfate</th>
<th>sulfuric</th>
<th>water</th>
</tr>
</thead>
</table>

(a) Hydrochloric acid reacting with sodium hydroxide:
hydrochloric ___________________________ + ___________________________
hydroxide → sodium chloride + water

(b) Sulfuric acid reacting with sodium hydroxide:
___________________________ acid + sodium hydroxide → sodium
___________________________ + ___________________________

(c) Nitric acid reacting with sodium hydroxide:
nitric acid + ___________________________ → sodium
___________________________ + water

3.2 Complete and balance the equations for the reactions in question 3.1.

<table>
<thead>
<tr>
<th>H₂O</th>
<th>H₂SO₄</th>
<th>NaCl</th>
<th>NaNO₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaOH</td>
<td>Na₂SO₄</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) HCl + ___________________________ → NaCl + H₂O

(b) ___________________________ + ___NaOH → Na₂SO₄ + ___H₂O

(c) HNO₃ + NaOH → ___________________________ + H₂O
## Acids and bases: what do I understand?

Think about your answers and confidence level for each mini-topic. Decide whether you understand it well, are unsure or need more help. Tick the appropriate column.

<table>
<thead>
<tr>
<th>Mini-topic</th>
<th>I understand this well</th>
<th>I think I understand this</th>
<th>I need more help</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can describe the pH scale.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I know the pH of acidic and alkaline solutions.</td>
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</tr>
<tr>
<td>I can name common acids and alkalis.</td>
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</tr>
<tr>
<td>I can write general word equations for reactions of an acid with a:</td>
<td></td>
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<tr>
<td>• metal</td>
<td></td>
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<tr>
<td>• metal oxide</td>
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<td></td>
<td></td>
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<tr>
<td>• metal hydroxide</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• metal carbonate</td>
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<tr>
<td>I can write chemical formulas for common laboratory acids.</td>
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<tr>
<td>I can name types of salt produced by reactions with:</td>
<td></td>
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</tr>
<tr>
<td>• hydrochloric acid</td>
<td></td>
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<tr>
<td>• sulfuric acid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• nitric acid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can use universal and litmus indicators to identify acidic, alkaline and neutral solutions.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Feeling confident? topics**

| I can write word equations for reactions between an acid and a:          |                         |                           |                  |
| • metal                                                                  |                         |                           |                  |
| • metal oxide                                                            |                         |                           |                  |
| • metal hydroxide                                                        |                         |                           |                  |
| • metal carbonate                                                        |                         |                           |                  |
| I can write symbol equations for reactions between an acid and a:       |                         |                           |                  |
| • metal                                                                  |                         |                           |                  |
| • metal oxide                                                            |                         |                           |                  |
| • metal hydroxide                                                        |                         |                           |                  |
| • metal carbonate                                                        |                         |                           |                  |