Types of chemical reaction

Scientists classify chemical reactions into different types - such as oxidation and neutralisation.

This exercises provides the equations for a number of chemical reactions.

For each reaction you are given a word equation, and an equation using chemical symbols:

magnesium + steam → magnesium oxide + hydrogen

$$\mathbf{Mg(s) + H_2O(g) \rightarrow MgO(s) + H_2(g)}$$

You should try to classify each of the examples given.

- ✔ type of reaction
- ❑ displacement
- ❑ neutralisation
- ❑ oxidation
- ❑ reduction
- ❑ thermal decomposition
- ❑ none of the above

For each reaction tick (✔) the box, or boxes, that describe the type of reaction. Some of the reactions may be examples of more than one type of reaction.

Some of the reactions may only occur when energy is provided (as heat, or as electrical energy), but this is not shown in the questions.

Tick (✔) 'none of the above' if the reaction does not seem to fit any of the suggestions.

Explain why you have classified the reaction the way you have.

1. **nitrogen + hydrogen → ammonia**

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

2. **sodium hydroxide + nitric acid → sodium nitrate + water**

$$NaOH(aq) + HNO_3(aq) \rightarrow NaNO_3(aq) + H_2O(l)$$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

3. **copper carbonate + sulfuric acid → copper sulfate + water + carbon dioxide**

$$CuCO_3(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + H_2O(l) + CO_2(g)$$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

4. **sodium + water → sodium hydroxide + hydrogen**

$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

5. **zinc + copper sulfate → zinc sulfate + copper**

$Zn(s) + CuSO_4(aq) \rightarrow ZnSO_4(aq) + Cu(s)$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

6. **copper carbonate → copper oxide + carbon dioxide**

$CuCO_3(s) \rightarrow CuO(s) + CO_2(g)$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

7. **sodium bromide + chlorine → sodium chloride + bromine**

$$2NaBr(aq) + Cl_2(aq) \rightarrow 2NaCl(aq) + Br_2(aq)$$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

8. **copper oxide + carbon → copper + carbon dioxide**

$$2CuO(s) + C(s) \rightarrow 2Cu(s) + CO_2(g)$$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

9. **methane + oxygen → carbon dioxide + steam**

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

10. **zinc + hydrochloric acid → zinc chloride + hydrogen**

$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

11. **sodium chloride → sodium + chlorine**

$2NaCl(l) \rightarrow 2Na(l) + Cl_2(g)$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____

12. **sodium nitrate → sodium nitrite + oxygen**

or

sodium nitrate(V) → sodium nitrate(III) + oxygen

$2NaNO_3(s) \rightarrow 2NaNO_2(s) + O_2(g)$

✔	type of reaction	I made this classification because:
❑	displacement	_____
❑	neutralisation	_____
❑	oxidation	_____
❑	reduction	_____
❑	thermal decomposition	_____
❑	none of the above	_____