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FORM 2

Chemistry

Non-redox reactions

Lesson notes for learners · Competence-Based Curriculum

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Many reactions happen around us, from the acid in a bottle of vinegar meeting an alkali to the salts that form when two solutions are mixed in a laboratory. Some chemical reactions involve electrons moving from one substance to another, and these are called redox reactions. Many others involve no such movement. In this note you learn what a non-redox reaction is and how to recognise one by checking whether oxidation numbers change.

AFTER THESE NOTES YOU SHOULD BE ABLE TO

- Say what a non-redox reaction is
- Give examples of non-redox reactions
- Justify why a reaction is non-redox using oxidation numbers and electron transfer
- Present your findings to your class

KEY WORDS

non-redox reaction	a chemical reaction in which there is no change in oxidation numbers and no transfer of electrons
oxidation number	a number given to an element in a substance that is used to follow changes in a reaction
electron transfer	the movement of electrons from one substance to another
neutralisation reaction	a reaction between an acid and an alkali that forms a salt and water
double displacement reaction	a reaction in which two compounds exchange partners to form two new compounds

1 What is a non-redox reaction

A non-redox reaction is a chemical reaction in which two things do not happen. First, the oxidation numbers of the elements do not change. Second, no electrons are transferred from one substance to another.

To decide whether a reaction is redox or non-redox, you use what you know about oxidation and reduction. If nothing is oxidised and nothing is reduced, the reaction is non-redox. In a non-redox reaction the oxidation numbers are the same before and after the reaction.

2 Common examples

Two common kinds of non-redox reaction are neutralisation reactions and double displacement reactions.

In a neutralisation reaction an acid reacts with an alkali. An example is hydrochloric acid with sodium hydroxide to give sodium chloride and water. In a double displacement reaction two compounds swap partners. An example is silver nitrate reacting with sodium chloride to give silver chloride and sodium nitrate.

Type	Equation	Oxidation numbers
Neutralisation	HCl + NaOH gives NaCl + H2O	Unchanged
Double displacement	AgNO3 + NaCl gives AgCl + NaNO3	Unchanged

Figure 1. Examples of non-redox reactions

3 Justifying that a reaction is non-redox

When you are asked to show that a reaction is non-redox, write down the reaction, state that the oxidation numbers of the elements are the same before and after, and state that no electrons are transferred. A good justification uses these two points together.

WORKED EXAMPLE

Show that HCl + NaOH gives NaCl + H2O is a non-redox reaction.

The reaction is a neutralisation reaction between an acid and an alkali

The oxidation numbers of the elements are the same before and after the reaction

No electrons are transferred from one substance to another

So it is a non-redox reaction

TRY THIS

In groups, search a textbook or other reference for more examples of non-redox reactions. Write each example in your exercise book and justify why it is non-redox, using what you know about oxidation and reduction. Share your findings with the class and check each other's justifications.

REMEMBER

- A non-redox reaction has no change in oxidation numbers and no transfer of electrons
- Neutralisation reactions are non-redox reactions
- Double displacement reactions are non-redox reactions
- In non-redox reactions the oxidation numbers are the same before and after
- Justify a non-redox reaction by stating the two points together

? Check yourself

1. What is a non-redox reaction?
2. Give one example of a neutralisation reaction.
3. Give one example of a double displacement reaction.
4. What happens to oxidation numbers in a non-redox reaction?
5. Are electrons transferred in a non-redox reaction?
6. A learner at a school near Feira mixes hydrochloric acid with sodium hydroxide solution and says it is a redox reaction. (a) Do you agree? (b) Name the type of reaction it is. (c) Justify your answer using oxidation numbers and electrons.
7. A group is told to present one non-redox reaction to the class. They choose silver nitrate with sodium chloride. (a) Write the reaction in words. (b) Name its type. (c) Explain how they should justify that it is non-redox.

ANSWERS

1. A reaction with no change in oxidation numbers and no transfer of electrons.
2. HCl + NaOH gives NaCl + H2O.
3. AgNO3 + NaCl gives AgCl + NaNO3.
4. They stay the same before and after the reaction.
5. No.
6. (a) No. (b) A neutralisation reaction. (c) The oxidation numbers do not change and no electrons are transferred, so it is non-redox.
7. (a) Silver nitrate and sodium chloride give silver chloride and sodium nitrate. (b) A double displacement reaction. (c) They should state that the oxidation numbers are the same before and after and that no electrons are transferred.

Written by 25Schools to follow the Form 2 Chemistry syllabus of the Zambian competence-based curriculum. Free for learners to read, download and share. More notes and quizzes at 25schools.com.