THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

YEARS 7 TO 9 · SCIENCE

Chemical reactions and energetics

Reading an equation, why it must balance, heat in and heat out, and the reaction patterns worth knowing.

WHAT IS INSIDE

- Reading a chemical equation
- Heat in and heat out
- Types of reaction worth recognising
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1 sets · a hint on every question

Written for a parent teaching at home. No training assumed, and nothing else to buy.

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Reading a chemical equation

Read this, then answer the questions on it.



READING A CHEMICAL EQUATION

An equation names what goes in and what comes out. A balanced one also asserts that no atoms were gained or lost on the way; an unbalanced one is simply not finished.

The substances on the left are the reactants and those on the right are the products. An equation is balanced when there are equal numbers of atoms for each element involved in the reaction, and it must satisfy that to be consistent with the law of conservation of matter.

The numbers in front of a formula may be changed to balance it. The numbers inside a formula may not, because changing those changes the substance into a different one.

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Types of reaction worth recognising

Read this, then answer the questions on it.



TYPES OF REACTION WORTH RECOGNISING

Four patterns cover most of what you will meet, and naming the pattern tells you what to expect.

Combustion: all forms of burning are chemical change, and the source lists them so. Breaking down by heating: heating calcium carbonate gives calcium oxide and carbon dioxide, and many compounds break down when heated. Oxidation: a substance gains oxygen, as iron does when it rusts. Neutralisation: an acid and a base react to produce a salt and water.

Noticing which pattern you are looking at is more useful than memorising equations, because the pattern predicts the products and the energy direction.

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How each one is answered

Mark it together. Where a question asks for a list, the order does not matter.



REACTIONS, EQUATIONS AND ENERGY

1. Name the substances on each side of an equation.

1. The left side holds the reactants.
2. The right side holds the products.

Answer: **reactants on the left, products on the right**

2. When is an equation balanced, and which law does that satisfy?

1. It is balanced when there are equal numbers of atoms for each element involved in the reaction.
2. It must satisfy that to be consistent with the law of conservation of matter.

Answer: **when the atoms of each element are equal on both sides, which satisfies the law of conservation of matter**

3. Explain why you may change the number in front of a formula when balancing but not the number inside it.

1. The number in front says how many of that substance there are.
2. A number inside the formula says how many atoms are in one unit of it.
3. Changing the inside number makes it a different substance, so the equation would no longer be about the same reaction.

Answer: **the front number counts the substance, the inside number defines it, so changing the inside makes it a different substance**

4. Give the two words for a change that releases heat and a change that absorbs it.

1. A change that releases heat is exothermic.
2. A reaction or change that absorbs heat is endothermic.

Answer: **exothermic and endothermic**

5. A cold pack feels cold when you squeeze it. Explain what is actually happening.

1. The reaction inside is endothermic, so it absorbs heat.
2. The heat it absorbs comes from its surroundings, which includes your hand.
3. Your hand losing heat is what you feel as cold, so the pack is not making cold but removing heat.

Answer: **an endothermic reaction absorbs heat from your hand, and losing heat is what feels cold**

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SAMPLE PAGES

You have read a few pages. The pack is longer.

What you are holding is a short sample, taken from different parts of the pack so that you can see how a week is planned and what a child is actually asked to do, before you decide.

The complete pack, and the rest of the academic materials, are on our website: schemes of work for a parent teaching at home, and practice packs for the skills children get stuck on.

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Members of the homeschool community do not buy these. If you have joined the community, the pack for the term you are working on is given to you at no cost.

Our Islamic Education classes are free. These packs are part of what pays the teachers who teach them.