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GCSE (9–1)
Transition Guide

GATEWAY SCIENCE CHEMISTRY A

J248
For first teaching in 2016

KS3–KS4 focus

Predicting and identifying reactions and products

Version 1

www.ocr.org.uk/chemistry

Contents

GCSE (9–1)

GATEWAY SCIENCE CHEMISTRY A

Key Stage 3 to 4 Transition guides focus on how a particular topic is covered at the different key stages and provide information on:

- Differences in the demand and approach at the different levels;
- Useful ways to think about the content at Key Stage 3 which will help prepare students for progression to Key Stage 4;
- Common student misconceptions in this topic.

Transition guides also contain links to a range of teaching activities that can be used to deliver the content at Key Stage 3 and 4 and are designed to be of use to teachers of both key stages. Central to the transition guide is a Checkpoint task which is specifically designed to help teachers determine whether students have developed deep conceptual understanding of the topic at Key Stage 3 and assess their 'readiness for progression' to Key Stage 4 content on this topic. This checkpoint task can be used as a summative assessment at the end of Key Stage 3 teaching of the topic or by Key Stage 4 teachers to establish their students' conceptual starting point.

Key Stage 3 to 4 Transition Guides are written by experts with experience of teaching at both key stages.

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Key Stage 3 Content

Periodic Table

- the varying physical and chemical properties of different elements
- the principles underpinning the Mendeleev Periodic Table
- the Periodic Table: periods and groups; metals and non-metals
- how patterns in reactions can be predicted with reference to the Periodic Table
- the properties of metals and non-metals
- the chemical properties of metal and non-metal oxides with respect to acidity.

Key Stage 4 Content

Sub-Topic C4.1 Predicting chemical reactions

C4.1a recall the simple properties of Groups 1, 7 and 0

C4.1b explain how observed simple properties of Groups 1, 7 and 0 depend on the outer shell of electrons of the atoms and predict properties from given trends down the groups

C4.1c recall the general properties of transition metals and their compounds and exemplify these by reference to a small number of transition metals

C4.1d predict possible reactions and probable reactivity of elements from their positions in the Periodic Table

C4.1e explain how the reactivity of metals with water or dilute acids is related to the tendency of the metal to form its positive ion

C4.1f deduce an order of reactivity of metals based on experimental results

Sub-Topic C4.2 Identifying the products of chemical reactions

C4.2a describe tests to identify selected gases

C4.2b describe tests to identify aqueous cations and aqueous anions

C4.2c describe how to perform a flame test

C4.2d identify species from test results

C4.2e interpret flame tests to identify metal ions

C4.2f describe the advantages of instrumental methods of analysis

C4.2g interpret an instrumental result given appropriate data in chart or tabular form, when accompanied by a reference set of data in the same form

Comment

The Key Stage 3 Science Programme of Study gives sufficient coverage of the principles and use of the Periodic table and the patterns that lie within it. The general properties of metals and non-metals and their relative positions in the table help learners develop knowledge of the patterns in reactions that result.

The broader detail in Key Stage 3 is given greater focus and Group 1 and 7 are used to further learners' predictive skills with respect to reactions and forms some of the basis for later ideas such as redox reactions. The study of metals extends to the Transition metals in order to allow for the development of the reactivity series of metals.

Properties

Learners tend to rely on their own awareness of the world around them. The idea that everything is made of particles (consisting mostly of space!) is contrary to the concrete world around them. Thus unseen participants such as oxygen or gaseous products tend not to be considered when observing a reaction. Thus the addition of the mass of oxygen or the loss of the mass of carbon dioxide tend to be overlooked.

Activities

Periodic Table Challenge: BPES
Resources: http://bpes.bp.com/secondary-resources/science/ages-12-to-14/the-periodic-table/periodic-table-challenge/

A continuous game of elimination to learn the nature of the elements.

Periodic Table lesson: TES
Resources: https://www.tes.com/teaching-resource/ks3-atoms-l2-periodic-table-6352230

Worksheets and ppt for a lesson looking at the development and use of the Periodic table.

Periodic Table quiz: Education Quizzes
Resources: http://www.educationquizzes.com/ks3/science/atoms-and-elements-01/

Short interactive quiz on the periodic table.

Metal or non-metal: Quizlet
Resources: https://quizlet.com/82067575/properties-of-metals-and-non-metals-flash-cards/

Online material and quizzes on the differences in physical properties of metals and non-metals.

Checkpoint task

The activities here have been designed for use in determining progress at both Key Stage 3 and 4. Running the activities before teaching Key Stage 4 material allows for measuring progress and for establishing a basis of learners' current knowledge.

Choice of how to present the questions has been left to the teacher. The teaching activities above already have a number of quizzes so using SOLO hexagons is a possibility here with learners building up a pictorial idea of how the properties and tests link.

Checkpoint Task:

www.ocr.org.uk/Images/312943-predicting-and-identifying-reactions-and-products-checkpoint-task.doc

Activities

The Periodic Table Challenge: BPES
http://bpes.bp.com/secondary-resources/science/ages-14-to-16/chemical-and-material-behaviour/periodic-table-challenge

Teacher's notes and an online quiz at three levels help learn the properties of the elements in three levels. By level 3 the questions need detailed knowledge of the reactions of the elements. This is excellent for developing skills in reading questions without error.

Tests for anions: Quizlet
https://quizlet.com/117939913/tests-for-anions-flash-cards/

An online activity covering all the necessary tests in a number of formats.

Tests for cations: Quizlet
https://quizlet.com/117939217/tests-for-cations-flash-cards/

An online activity covering all the necessary tests in a number of formats.

Reactivity Series: Quizlet
https://quizlet.com/112757733/chemistry-reactivity-series-flash-cards/

An online quiz with a variety of tasks covering the detail of creating the reactivity series.

Tests for gases
https://www.youtube.com/watch?v=LiAvDpl5aJA

A short video covering the tests for oxygen, carbon dioxide and hydrogen.

Activities

Inspirational chemistry - analysis: Learn Chemistry
http://www.rsc.org/learn-chemistry/resource/res00001936/analysis

The first two experiments on this page give learners the opportunity to see the tests and their results in action. Please note considerable care has to be taken with the reaction of hydroxide with aluminium as the precipitate is very quick to redissolve and may not be seen. All sheets and instructions are given.

Effects of acid rain: Learn Chemistry
http://www.rsc.org/learn-chemistry/resource/res00000068/afl-what-are-the-effects-of-acid-rain

This is a piece of project work linking chemistry to real life. The tests that could be made give a chance to reinforce tests for gases and the reactivity series. Again all sheets and instructions are given.

Resources, links and support

Learners need to be aware of instrumental methods both in terms of their speed and precision. Few schools have the facilities to do this with the instruments concerned. The Learn Chemistry website has a number of very good videos that show the machines in action and discuss their use. Spectra/ chromatograms are also available for class discussion. If at all possible link to the local university for access to their equipment.

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