

TOPIC 1 INTRODUCTION TO THE LAB

LESSON PLAN

Aim: Learn the names of lab equipment, know how to use them, and identify what hazard symbols mean.

Teaching objectives

Content

- Lab instruments and their use
- Common hazard symbols that appear in chemicals
- Dangers and rules

Communication

- Naming and describing lab instruments.
- Asking for and giving information.
- Understand oral instructions
- Understand writing instructions
- Use of the structures: "It's something we use to measure....."; "It's used to....."; "It looks like"; "It's a kind of....."

Cognition

- To describe lab instruments and their use
- To show the need of lab instruments
- To memorize lab instruments and their use
- To present the most common hazard symbols that appear in chemicals
- To analyze the hazard of chemicals at student's home

Culture

- Uses of lab instruments and hazard symbols around the world.

Outcomes

At the end of the lesson, students will be able to:

- Know the main characteristics of lab instruments
- Understand new scientific vocabulary
- Recognize the importance of working as a team in science
- Develop a sense of responsibility when working in a laboratory
- Know how to behave in a laboratory

Tasks planned and timing

- A) Lab instruments (1 hour)
- A power-point describing the different instruments used in a laboratory. (20 min)

http://www.sciencegeek.net/Chemistry/Powerpoint/Equipment/Equipment_files/frame.htm

- Student's worksheets, this will be an individual task (10 min)
- Students will be provided with two sets of cards for the matching exercise (20 min)
- Plenary: correction of the previous exercise and discussion about it (5 min)
- B) Hazards (1 hour)
- A power-point describing the hazard symbols (20 min)
<http://tre.ngfl.gov.uk/server.php?request=cmVzb3VyY2UuZnVsbHZpZXc%3D&resourceId=8628>
- Students will be provided with worksheets; this will be an individual task. (15 min)
- Plenary: correction of the previous exercise and discussion about it (10 min)
- Homework: (60 min)

Resources

- For the power-point: a computer, a screen and an LCD projector.
- For the activities and homework: one photocopy for each student
- For the work: sets of cards with lab equipment

Assessment

- Homework

TOPIC 2 MIXTURES

LESSON PLAN

Aim: To identify and describe the properties of all kinds of mixtures. To observe, make predictions and draw conclusions in a lab activity.

Teaching objectives

Content

- Homogeneous mixtures and heterogeneous mixtures, solutions and pure substances.
- Properties of all the different kinds of mixtures.
- Processes to separate mixtures

Cognition

- Comparing and contrasting properties of all kinds of matters
- Identify key words and concepts.
- Create a coherent piece of writing
- To observe, make predictions and draw conclusions in a lab activity.

Communication

- Understanding words with precise scientific meaning: element, compound, mixture, solution.
- Naming and describing elements of the periodic table and binary compounds.
- Reading a scientific text
- Apply new and previously learnt vocabulary
- Reporting group work

Culture

- Uses of same formulae around the world.

Outcomes

At the end of the lesson, students will be able to:

- Describe the main characteristics of mixtures, solutions, compounds and elements
- Classify different substances according to their properties
- Compare elements to compounds and how they are represented by symbols and formulae
- Recognise chemical change as a process in which atoms join together in new ways
- Distinguish between compounds and mixtures
- Learn the techniques to separate different mixtures
- Define element and identify symbols of some common elements
- Read a scientific text
- Extract the main ideas of a scientific text

- Work cooperatively with group members to carry out a plan, and troubleshoot problems as they arise.
- Demonstrate work habits that ensure personal safety, the safety of others as well as consideration for the environment

Tasks planned and timing

- Students will be provided with several worksheets to work individually on the text (20 min) and in pairs on the activities (30 min)
- Plenary: correction of the previous exercises and discussion about them (10 min)
- Students will be provided with worksheets for the lab activities. (45 min each)
- Plenary: Explanation of the lab activity and discussion about it at the end of the class (10 min)
- Homework (60 min)

Resources

- For the power-point: a computer, a screen and an LCD projector.
- For the activities: one photocopy for each student.
- For the homework: a handout with the text and the tasks to be done for each student

Assessment

- Homework and lab activities

Evaluation

Teacher tips

To start the topic:

<http://tre.ngfl.gov.uk/server.php?request=cmVzb3VyY2UuZnVsbHZpZXc%3D&resourceId=10156>

Mixtures:

<http://www.nclark.net/StudyMatter>

<http://wblrd.sk.ca/~science10/unita/redon12.html>

<http://www.elmhurst.edu/~chm/vchembook/106mixture.html>

Filtration: <http://wblrd.sk.ca/~science10/unita/redon17.html>

Elements-Compounds poem and activity:

http://www.evanschemistrycorner.com/WS/MatterWS/WS1-7-2_Elements_Compounds_and_Mixtures.pdf

TOPIC 3 ACIDS AND ALKALIS

LESSON PLAN

Aim: To identify and describe the properties of acids and alkalis. To observe, make predictions and draw conclusions in a lab activity.

Teaching objectives

Content

- Acids and alkalis, properties and uses
- pH scale.
- Neutralization

Communication

- Reading a scientific text
- Scanning for information
- Naming some common acids and alkalis.
- Understand oral instructions
- Reporting group work
- Ask questions to gain clarification and further information

Cognition

- To understand vocabulary and sentences related with the topic
- To identify key information in a text
- To summarize and record information in a variety of forms
- To observe, make predictions and draw conclusions in a lab activity
- To apply strategies to talk in the plenary using previously learnt vocabulary and grammatical structures

Culture

- Uses of acids and alkalis around the world.
- Uses of the same techniques to measure pH around the world.

Outcomes

At the end of the lesson, students will be able to:

- Classify acids and alkalis as chemicals with distinct properties and uses.
- Use indicators to classify solutions as acidic, alkaline or neutral.
- Use the pH scale to compare the acidity and alkalinity of different solutions.
- Interpret observations, making comparisons and seeing simple patterns.
- Recognise and deal with risks and hazards relating to acids and alkalis.
- Name some common acids and alkalis.
- Explain how acids and bases interact to form a salt and water in the process of neutralization.
- Describe some everyday uses of acids, alkalis.

- Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment.

Tasks planned and timing

- A power-point display to understand the pH scale, and the identification, properties and behaviours of acids, alkalis and salts will be provided. http://kent.skool.co.uk/keystage4.aspx?id=316#1_1. (20 min).
- Illustrative experiments to introduce the topic and to analyze students' previous ideas. (30 min)
- Student's worksheets, for the text work individually (30 min) for the activities work groups of three (15 min)
- Plenary: correction of the previous exercises and discussion about them (10 min)
- Student's worksheets for the lab activities. (45 min each)
- Plenary: Explanation of the lab activity and discussion about it at the end of the class (10 min)
- A power-point to summarize the concepts: <http://kent.skool.co.uk/keystage3.aspx?id=64>
- Homework: (1 h)

Resources

- For the power-point: a computer, a screen and an LCD projector.
- For the activities: one photocopy for each student.
- For the homework: a handout with the text and the tasks to be done for each student

Assessment

- Homework and lab activities.

Evaluation

Teacher Tips

<http://www.miamisci.org/ph/>

TOPIC 4. CHEMICAL REACTIONS

LESSON PLAN

Aim: Describe the characteristics of different chemical reactions. Learn how chemical equations are used to describe chemical reactions

Teaching objectives

Content

- Chemical reactions.
- Classification of chemical reactions
- Law of conservation of mass

Communication

- Understand oral and writing instructions
- Scanning for information
- Create a coherent piece of writing
- Apply new and previously learnt vocabulary and grammatical structures.
- Explain conclusions
- Apply strategies to report group work

Cognition

- Recognize names of binary compounds.
- Understand vocabulary and sentences related with the topic.
- Investigate the Law of Conservation of Mass, and recognize that mass is conserved in chemical reactions.
- Identify key information in a text
- Observe, make predictions and draw conclusions in a lab activity.
- Organize facts/ideas/information in an appropriate sequence.
- Link ideas and paragraphs into continuous text that is organised and coherent.

Culture

- Uses of the same way to present chemical equations around the world.

Outcomes

At the end of the lesson, students will be able to:

- Recognize the difference between a physical reaction and a chemical reaction
- Recognize that mass is conserved in chemical reactions
- Consider how chemical reactions are used to make new materials
- Model chemical reactions as the rearrangement of atoms, and use the model to explain that matter is not lost
- Write formulas and names of binary ionic compounds.
- Represent chemical reactions by word and/or symbol equations

- Balance chemical equations
- Classify reactions as synthesis, decomposition, single displacement, double displacement, or combustion.
- State a conclusion based on analysis and interpretation of the data.
- Present observations in ways which enable patterns to be seen
- Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment.

Tasks planned and timing

- Activity 1: Listen to the power-point presentation twice, first time without subtitles and second time with them
<http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/rocks/atomsact.shtml>
- Student's worksheets for the activities work in pairs (40 min)
- Plenary: correction of the previous exercises and discussion about them (10 min)
- Student's worksheets for the lab activities. (45 min each)
- Plenary: Explanation of the lab activity and discussion about it at the end of the class (10 min)
- Homework: (1 h)

Resources

- For the power-point: a computer, a screen and an LCD projector.
- For the activities: one photocopy for each student.
- For the homework: a handout with the text and the tasks to be done for each student

Teacher tips

Plenty of interesting presentations and activities on the following web pages:

<http://lgfl.skool.co.uk/keystage3.aspx?id=64>
<http://lgfl.skool.co.uk/keystage4.aspx?id=314>

Flash animation for endothermic and exothermic reactions
<http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/activa2.swf>

Chemical reaction types
<http://www.usoe.k12.ut.us/curr/science/sciber00/8th/matter/sciber/chemtype.htm>

Tutorials for balancing
<http://www.wfu.edu/%7EYylwong/balanceeq/balanceq.html>
<http://funbasedlearning.com/chemistry/chembalancer2/default.htm>

Assessment

- Homework and lab activities.

Evaluation

TOPIC 5 RATE OF REACTION

LESSON PLAN

Aim: Learn that chemical reaction rates depend on factors that influence the frequency of collision of reactant molecules.

Teaching objectives

Content

- The rate of reaction is the decrease in concentration of reactants or the increase in concentration of products with time.
- How reaction rates depend on such factors as concentration, temperature, and pressure.
- The role a catalyst plays in increasing the reaction rate.
- The definition and role of activation energy in a chemical reaction

Communication

- Understand oral and writing instructions
- Scanning for information
- Create a coherent piece of writing
- Apply new and previously learnt vocabulary and grammatical structures.
- Explain conclusions
- Apply strategies to report group work

Cognition

- Identify key information in a text
- Observe, make predictions and draw conclusions in a lab activity.
- Organize facts/ideas/information in an appropriate sequence.
- Link ideas and paragraphs into continuous text that is organised and coherent.

Culture

- Uses of the same way to present chemical equations around the world.

Outcomes

At the end of the lesson, students will be able to:

- Relate the collision theory to factors affecting rates of chemical reactions.
- List four factors that affect the rates of chemical reactions and explain the role of a catalyst.
- State a conclusion based on analysis and interpretation of the data.
- Present observations in ways which enable patterns to be seen
- Demonstrate work habits that ensure personal safety, the safety of others, as well as consideration for the environment.

Tasks planned and timing

- Activity 1: Listen to the power-point presentation twice, <http://lgfl.skool.co.uk/keystage4.aspx?id=316> .Activity 6 : Rates of reaction
- Student's worksheets for the activities work in pairs (40 min) Plenary: correction of the previous exercises and discussion about them (10 min)
- Student's worksheets for the lab activities. (45 min each)
- Plenary: Explanation of the lab activity and discussion about it at the end of the class (10 min)

Resources

- For the power-point: a computer, a screen and an LCD projector.
- For the activities: one photocopy for each student.

Teacher tips

Reaction rates revision

http://www.bbc.co.uk/schools/gcsebitesize/science/add_aqa/chemreac/ratesrev1.shtml

Assessment

- Lab activities.

Evaluation