**Test: Topics 1, 2 and 3**

1. *Use the properties of the metals listed in the table below* to answer the following questions.



(a) Give one reason why most household electrical wiring is made of copper rather than iron.

 (1 mark) KA2

(b) Explain why copper is more effective than aluminium as a material for the base of saucepans.

 (2 marks) KA2

(c) Explain why overhead street electrical cables are made of aluminium rather than copper.

 (2 marks) KA2

2. Use the Periodic Table supplied to answer the following questions about the first 20 elements.

(a) For the element sodium:

 (i) Identify the Group of the Periodic Table to which it belongs

 (1 mark) KA1

 (ii) Identify the block of the Periodic Table to which it belongs

 (1 mark) KA1

(b) State which one of the first 20 elements has the greatest electronegativity.

 (1 mark) KA1

(c) Name one element that has three valence electrons.

 (1 mark) KA1

(d) (i) Write the electronic configuration for chlorine.

 (1 mark) KA1

 (ii) State the number of valence electrons in a chloride ion.

 (1 mark) KA1

 (iii) State which one of the first 20 elements behaves chemically most like chlorine.

 (1 mark) KA1

(e) Complete the following information for the element with atomic number 11 and mass number 23.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Number of protons | Number of neutrons | Number of electrons |
|  |  |  |  |

 (4 marks) KA1

3. Four elements, identified as J, K, and L, are represented below:

 J K L

 Explain which two are isotopes of the same element.

 (2 marks) KA1

4. Determine the moles of nickel atoms present in:

(a) 2.03 x 1024 atoms of nickel

 (1 mark) KA2

(b) 23.5 g of nickel

 (2 marks) KA2

5. Determine the empirical formula of the compound with following composition by mass:

23.3% magnesium, 30.7% sulfur and 46.0% oxygen.

 (3 marks) KA2

6. Magnesium is a light, soft and brittle metal.

(a) When magnesium is mixed with other metals such as aluminium, it produces a new metal that is suitable for use in car wheels.

 (i) State the name given to the process of mixing two or more metals to make a new material.

 (1 mark) KA1

 (ii) Discuss how the development by engineers of car wheels made from a mixture of magnesium with aluminium, to replace wheels made from steel, is an example of science as a human endeavour.

 (3 marks) KA3

(b) Magnesium reacts with chlorine to form the compound for magnesium chloride.

 (i) Write the electronic configuration of a magnesium ion.

 (1 mark) KA1

 (ii) Write the formula for magnesium chloride.

 (1 mark) KA1

 (iii) (1) State the type of structure found in magnesium chloride.

 (1 mark) KA1

 (2) Draw a well-labelled diagram showing the structure of magnesium chloride.

 (2 marks) KA1

 (3) Use this structure to explain the following properties of magnesium chloride.

 (A) Magnesium chloride is brittle.

 (2 marks) KA1

 (B) Molten magnesium chloride conducts an electric current very well.

 (2 marks) KA1

7. Sorbolene and Glycerine Cream can be used as an alternative to soap for cleaning the skin. The main ingredients are paraffins and glycerol.

(a) The structural formula of a paraffin is shown below:



 Name the hydrocarbon family to which this paraffin belongs.

 (1 mark) KA1

(b) The structural formula of glycerol is shown below:



 (i) Glycerol molecules contain the polar O – H bond. Explain why the O – H bond is polar.

 (2 marks) KA1

 (ii) On the diagram above, indicate the polarity of an O – H bond, using the correct symbols for partial charges. (2 marks) KA1

(c) Water is present in the skin.

 (i) Draw the electron dot structure of the water molecule.

 (2 marks) KA1

 (ii) Name the shape of the water molecule.

 (1 mark) KA1

 (iii) Explain the shape of the water molecule.

 (3 marks) KA1

 (iv) Explain why glycerol is soluble in water in the skin.

 (2 marks) KA2

(d) (i) State and explain whether chemists would formulate a skin cleanser with paraffin or glycerol to dissolve the non-polar oil on the skin.

 (4 marks) KA2

 (ii) Explain how the development of a new skin cleanser by chemists might illustrate one of the key concepts of science as a human endeavour.

 (2 marks) KA3

8. Some compounds found in nature can also be produced synthetically in a laboratory. Vitamin C is one example of such a compound.

 Explain how the chemical reactivity of synthetically produced Vitamin C compares with that of the naturally produced form.

 (2 marks) KA2

**Assessment Conditions for this task**

All questions are completed individually under direct teacher supervision.

Time: 50 minutes + 5 minutes reading time.

Students are provided with a periodic table and a formula sheet.

Knowledge and Application: KA 1, 2, 3

| - | Investigation, Analysis, and Evaluation | Knowledge and Application |
| --- | --- | --- |
| A | Critically deconstructs a problem and designs a logical and coherent chemistry investigation with detailed justification.Obtains, records, and represents data, using appropriate conventions and formats accurately and highly effectively.Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.Critically and logically evaluates procedures and discusses their effect on data. | Demonstrates deep and broad knowledge and understanding of a range of chemical concepts.Applies chemical concepts highly effectively in new and familiar contexts.Critically explores and understands in depth the interaction between science and society.Communicates knowledge and understanding of chemistry coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear chemistry investigation with reasonable justification.Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.Logically evaluates procedures and their effect on data. | Demonstrates some depth and breadth of knowledge and understanding of a range of chemical concepts.Applies chemical concepts mostly effectively in new and familiar contexts.Logically explores and understands in some depth the interaction between science and society.Communicates knowledge and understanding of chemistry mostly coherently, with effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear chemistry investigation with some justification.Obtains, records, and represents data, using generally appropriate conventions and formats, with some errors but generally accurately and effectively.Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.Evaluates procedures and some of their effect on data. | Demonstrates knowledge and understanding of a general range of chemical concepts.Applies chemical concepts generally effectively in new or familiar contexts.Explores and understands aspects of the interaction between science and society.Communicates knowledge and understanding of chemistry generally effectively, using some appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a chemistry investigation.Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.Describes data and undertakes some basic interpretation to formulate a basic conclusion.Attempts to evaluate procedures or suggest an effect on data. | Demonstrates some basic knowledge and partial understanding of chemical concepts.Applies some chemical concepts in familiar contexts.Partially explores and recognises aspects of the interaction between science and society.Communicates basic chemical information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a chemistry investigation.Attempts to record and represent some data, with limited accuracy or effectiveness.Attempts to describe results and/or interpret data to formulate a basic conclusion.Acknowledges that procedures affect data. | Demonstrates limited recognition and awareness of chemical concepts.Attempts to apply chemical concepts in familiar contexts.Attempts to explore and identify an aspect of the interaction between science and society.Attempts to communicate information about chemistry. |

Performance Standards for Stage 1 Chemistry