

# Chemistry Assessment Task

## The Chemical Earth

### Outcomes

<b>Prescribed Focus Area</b>	2. the nature and practice of chemistry	P2. applies the processes that are used to test and validate models, theories, and laws of science with particular emphasis on first-hand investigations in chemistry
<b>Domain: Knowledge</b>	6. atomic structure and periodic table	P6. explains trends and relationships between elements in terms of atomic structure and bonding
<b>Domain: Skills</b>	13. communicating information and understanding	P13. identifies appropriate terminology and reporting styles to communicate information and understanding
	14. developing scientific thinking and problem solving	P14. draws valid conclusions from gathered data and information

### 2. **Although most elements are found in combinations on Earth, some elements are found uncombined**

*Students learn to:*

2.2 classify elements as metals, non-metals and semi-metals according to their physical properties

*Students:*

2.3.1 analyse information from secondary sources to distinguish the physical properties of metals and non-metals

2.3.2 process information from secondary sources and use a Periodic Table to present information about the classification of elements as:

- metals, non-metals and semi-metals solids, liquids and gases at 25°C and normal atmospheric pressure

### 3. **Elements in Earth materials are present mostly as compounds because of interactions at the atomic level**

*Students learn to:*

3.3 describe atoms in terms of mass number and atomic number

3.4 describe the formation of ions in terms of atoms gaining or losing electrons

3.5 apply the Periodic Table to predict the ions formed by atoms of metals and non-metals

3.6 apply Lewis electron dot structures to:

- the formation of ions
- the electron sharing in some simple molecules

3.7 describe the formation of ionic compounds in terms of the attraction of ions of opposite charge

3.8 describe the formation of covalent molecules in terms of sharing of electrons

# Marking Rubric

## Part A

45-50 marks	<ul style="list-style-type: none"> <li>Information is presented in an appropriate table with correct headings for each column.</li> <li>The required information (<i>element name, atomic number, atomic mass, electron configuration, melting point, state at 25°C, electrical conductivity</i>) has been extracted from the stimulus material and entered into the table with a high degree of accuracy.</li> </ul>
35-44 marks	<ul style="list-style-type: none"> <li>Information is presented in a table with correct headings for each column.</li> <li>The required information (<i>element name, atomic number, atomic mass, electron configuration, melting point, state at 25°C, electrical conductivity</i>) has been extracted from the stimulus material and entered into the table with some accuracy.</li> </ul>
25-34 marks	<ul style="list-style-type: none"> <li>Information is presented in a table.</li> <li>Some of the required information (<i>element name, atomic number, atomic mass, electron configuration, melting point, state at 25°C, electrical conductivity</i>) has been extracted from the stimulus material and entered into the table. The information contains some errors.</li> </ul>
15-24 marks	<ul style="list-style-type: none"> <li>Information is presented in a table however, the format is inappropriate.</li> <li>Some of the required information (<i>element name, atomic number, atomic mass, electron configuration, melting point, state at 25°C, electrical conductivity</i>) has been extracted from the stimulus material and entered into the table. The information contain a significant number of errors.</li> </ul>
< 15 marks	<ul style="list-style-type: none"> <li>Information is not presented in a table.</li> <li>Information (<i>element name, atomic number, atomic mass, electron configuration, melting point, state at 25°C, electrical conductivity</i>) extracted from the stimulus material contains a significant number of errors and/or is incorrect.</li> </ul>

## Part B

12 marks	<ul style="list-style-type: none"> <li>Correct terminology has been used to identify the type of chemical bonding for each substance.</li> <li>Correct terminology has been used to describe the nature of the bonding in terms of the sharing and/or arrangement of electrons.</li> </ul>
8-11 marks	<ul style="list-style-type: none"> <li>The type of chemical bonding has been identified for each substance.</li> <li>The nature of the bonding has been described with some reference to the sharing and/or arrangement of electrons.</li> </ul>
4-7 marks	<ul style="list-style-type: none"> <li>The type of chemical bonding has been identified for some substances.</li> <li>The nature of the bonding has been described for some substances with minimal reference to the sharing and/or arrangement of electrons.</li> </ul>
< 4 marks	<ul style="list-style-type: none"> <li>The type of chemical bonding has been identified for some of the substances <b>OR</b> the nature of the bonding has been described for some of the substances with minimal reference to the sharing and/or arrangement of electrons.</li> </ul>

## Part C

16-18 marks	<ul style="list-style-type: none"> <li>Lewis electron dot structures have been applied, accurately, to show the formation of ions and simple molecules.</li> </ul>
12-15 marks	<ul style="list-style-type: none"> <li>Lewis electron dot structures have been applied, with a high degree of accuracy, to show the formation of ions and simple molecules.</li> </ul>
8-11 marks	<ul style="list-style-type: none"> <li>Lewis electron dot structures have been applied, to show the formation of some ions and simple molecules.</li> </ul>
< 8 marks	<ul style="list-style-type: none"> <li>Lewis electron dot structures have been applied, with difficulty, to show the formation of some ions and simple molecules.</li> </ul>

**Part A: (50 marks)**

Use the stimulus material to *tabulate* the following information for the lettered parts of the periodic table show below. The letters DO NOT represent the symbols of the elements identified.

A																		
D												E	B	F	C			
	G																H	
													I					J

Required information:

1. Element name
2. Atomic number
3. Atomic mass
4. Electron configuration (A – G only)
5. Melting point
6. State at 25°C
7. Electrical conductivity

**Part B: (12 marks)**

Describe the *nature* and *type* of bonding found within:

1. Substance B
2. Substance D
3. The compound formed between C and G
4. The compound formed between F and H

**Part C: (18 marks)**

*Construct* electron dot diagrams for the following:

1. Magnesium ion
2. Chlorine gas
3. Iodide ion
4. Aluminium
5. A compound of Hydrogen and Nitrogen
6. A compound of Magnesium and Fluorine
7. Cl<sub>2</sub>O
8. Al<sub>2</sub>O<sub>3</sub>