



Intermediate Science 9  
Unit 2: Atoms, Elements and Compounds  
**Study Guide For Test 2**

**Know the following terms:**

Atomic Number	Atomic Mass Number	Isotope
Metal	Nonmetal	Metalloid
Energy level	Valence energy level	Valence electron
Molecule	Compound	Ion
Anion	Cation	Covalent Bond
Molecular Compound	Ionic Bond	Ionic Compound
Reactant	Product	Effervescent
Precipitate		

**Know the following**

- Distinguish between atomic number and atomic mass
- using atomic mass and atomic number for an element, determine its number of protons, electrons, and neutron
- Understand Isotopes
- using the Periodic Table, develop an understanding that the elements are grouped on the basis of similar characteristics. Include:
  - metals
  - non-metals
  - metalloids
  - transition metal
- List the properties of metals, non-metals and metalloids

Properties of Metals, Non-metals, and Metalloids				
	State at Room Temperature	Appearance	Conductivity	Malleability and Ductility
Metals	<ul style="list-style-type: none"> <li>solid except for mercury (a liquid)</li> </ul>	<ul style="list-style-type: none"> <li>shiny lustre</li> </ul>	<ul style="list-style-type: none"> <li>good conductors of heat and electricity</li> </ul>	<ul style="list-style-type: none"> <li>malleable</li> <li>ductile</li> </ul>
Non-metals	<ul style="list-style-type: none"> <li>some gases</li> <li>some solids</li> <li>only bromine is a liquid</li> </ul>	<ul style="list-style-type: none"> <li>not very shiny</li> </ul>	<ul style="list-style-type: none"> <li>poor conductors of heat and electricity</li> </ul>	<ul style="list-style-type: none"> <li>brittle</li> <li>not ductile</li> </ul>
Metalloids	<ul style="list-style-type: none"> <li>solids</li> </ul>	<ul style="list-style-type: none"> <li>can be shiny or dull</li> </ul>	<ul style="list-style-type: none"> <li>may conduct electricity</li> <li>poor conductors of heat</li> </ul>	<ul style="list-style-type: none"> <li>brittle</li> <li>not ductile</li> </ul>

- identify the maximum number of electrons which exist in the first three energy levels

**first shell**    ⇒    **a maximum of 2 electrons**  
**second shell** ⇒    **a maximum of 8 electrons**  
**third shell**    ⇒    **a maximum of 8 electrons**

6. Define the following
- Energy Level
  - Valence Energy Shell
  - Valence Electron
7. Draw Bohr-Rutherford diagrams for elements 1 to 18.
8. Identify examples of common elements, and compare their characteristics and atomic structure
- Group 1A indicates the number of valence electrons in a specific atom***
- Period number indicates the number of energy levels (shells)***
10. make comparisons of energy level diagrams for elements from the same family (group)
- Noble Gases are stable because they have their valence shell completely filled***
- Atoms of other families gain or lose electrons to fill their valence shell and become more stable like a noble gas***
- Example:***
- Alkali Metals lose their one valence electron***
  - Alkaline Earth Metals lose their two valence electrons***
  - Halogens gain one valence electron***
11. Explain the difference between
- (a) a covalent bond and an ionic bond
  - (b) an atom and an ion
  - (c) a cation and an anion
12. Identify whether a simple compound is ionic or molecular (covalent).
13. Identify that a compound is represented by a combination of element symbols known as a chemical formula, which indicates the proportion in which the elements are present
14. list chemical formulas for some common chemical ionic compounds. Include:
- (i) table salt or sodium chloride (NaCl)
  - (ii) calcium carbonate (CaCO<sub>3</sub>)
  - (iii) Sodium hydroxide (NaOH)
15. Name simple ionic compounds
16. List chemical formulas for some common chemical molecular (covalent) compounds. Include:
- (i) sucrose or table sugar (C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>)
  - (ii) carbon dioxide (CO<sub>2</sub>)
  - (iii) methane (CH<sub>4</sub>)
  - (iv) water (H<sub>2</sub>O)
17. Name simple molecular (covalent) compounds
18. Distinguish between physical and chemical changes
19. Recognize that chemical changes produce new substances (elements or compounds), but physical changes do not

20. List examples of physical and chemical changes:

21. List evidence for chemical and physical change.

"Aluminum metal is a shiny grey solid which reacts with hydrochloric acid to produce hydrogen gas and a clear colourless solution of aluminum chloride. The test tube heats up during the process."

(a) Using the above statement, list **two** (2) physical properties of aluminum metal.

(b) " " " " list **one** (1) chemical property

22. The recognize that during a chemical change, elements are conserved but compounds are not

Physical Change	
i) change of state ii) cutting iii)dissolving Chemical i) corrosion ii) fruit ripening iii)combustion	(i) heat is produced or absorbed (ii) a new color appears (iii) a precipitate is formed (iv) a gas is produced (v) process is difficult to reverse

KNOW THE FOLLOWING QUESTION	
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JOKE:

What happens when electrons lose their energy?

*They get Bohr'ed.*