

Sc. 9
CHEMISTRY REVIEW
REVIEW WORKSHEET

Name _____
Date _____
BLK _____

The student should be able to:

1. Describe the classification of matter.
2. Describe the conservation of mass.
3. Identify products and reactions in a chemical equation.
4. Describe the structure of an atom including its parts.
5. Locate elements on the periodic table and use the periodic table to determine details of atomic structure such as: # of protons, neutrons and electrons; mass number & atomic mass; number of electron orbits and # of electrons on each orbit
6. Make "Bohr diagrams" of atoms, ions and isotopes
7. Define atom, element, ion, isotope, compound, molecule, bond, ionic bond, covalent bond
8. Describe patterns on the periodic table
9. Write chemical formulas for ionic and covalent compounds.
10. Write names for ionic and covalent compounds
11. Explain how ionic and covalent bonds form & which is generally stronger
12. Explain why alkali and halogen elements are so chemically active & the inert elements are not

Some atomic definitions are:

Symbol: an abbreviation of the name of an element

Atomic number: the number of protons in the nucleus of an element. All atoms of the same element have the same atomic number.

Atoms of the same element are electrically neutral and thus:

Atomic # = # of protons = # of electrons

Mass number: the total number of protons and neutrons in an element

Mass number = # of protons + # of neutrons

So: # of neutrons = mass number - # of protons

Isotope: an element whose atomic number is constant but whose mass number varies due to a variation in the number of neutrons in atoms of the element.

Example: Chlorine has two isotopes, chlorine 35 and Chlorine 37. The symbols for Cl^{35} and Cl^{37} are written as follows:



Atomic Mass: the weighted average mass of all the natural isotopes of an element

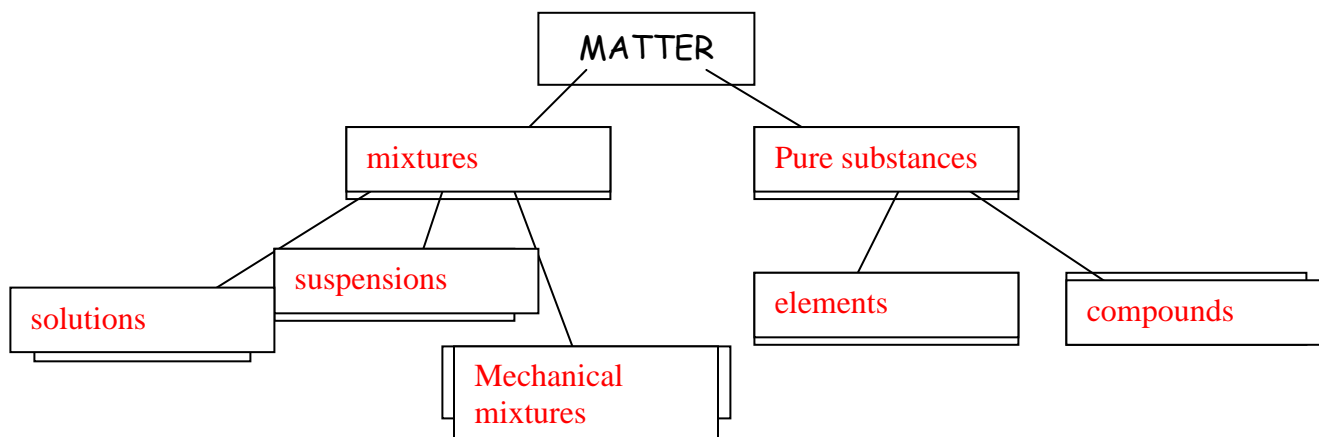
Elements are arranged on the periodic table in order of increasing atomic number, with the vertical columns being called **groups** and the horizontal rows being called **periods**. Each new period represents a different number of electron orbits and the members of each group have similar chemical properties.

Period I has one orbit and Group 1 are the alkali metals; Period 2 has two orbits and Group VII are the Halogen Gases; period 3 has three orbits and Group VIII are the Inert Gases.

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1. Classification of MATTER. Fill in the following chart (7).



2. Define :

- a) HOMOGENEOUS (1) _____ appears the same throughout _____
 b) HETEROGENEOUS (1) _____ appears different _____

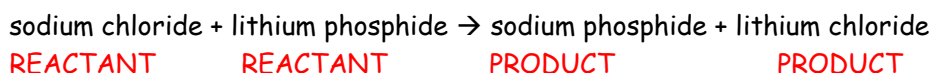
3. Which of the following is: HOMOGENEOUS (box) or HETEROGENEOUS (circle) (3):

Element, Compound, Mixtures, Suspensions, Solutions, Mechanical mixtures

4. State the Law of conservation of mass (1):

The mass of the reactants in a chemical reaction will equal the mass of the products.

5. Identify the PRODUCTS and the REACTANTS in the following EQUATION (1):



6. a) What is an electron orbit? (1)

the path of an electron around the nucleus of an atom

b) How many electrons are in the outer orbit (valence shell) of the following elements? (6)

Lithium atom	1	Na	1	Element that has 9 protons and 10 neutrons	7
Lithium ion	2	1_1H (Hydrogen)	1	2_1H (Deuterium)	1
Atomic # 35	17	Element with a mass # of 40	8	Element with an atomic # 20 and an ion charge of +2	8
Element with 8 electrons	6	Krypton atom	18	Carbon - 14	4

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7. What is in common about the electron structure of: (3)

a) alkali metals
all have 1 valence electron

b) halogen nonmetals
all missing 1 valence electron

c) Inert gases
valence shell is full/stable

***valence = outermost shell

8. What is common about the electron structure of all elements in the same period? (1)

Same 3 of shells/orbits

4. How many electron **orbits** are there in: (1)

A carbon atom	A chlorine isotope	An antimony atom
2	3	5

9. Why are the inert gases not chemically reactive? (1)

Full valence shells

10. What is it about the electron structure of the Alkali metals and the Halogen nonmetals that makes them so highly chemically active? (2)

Alkali metals **HAVE** only 1 electron in valence shell, therefore, easily gives it away.

Halogen non-metals **NEED** only 1 electron to complete their valence shell, therefore, easily acquired.

11. What happens to the atomic number, the number of protons, the number of electrons and the atomic mass as you move from left to right along the third period of the periodic table? (4)

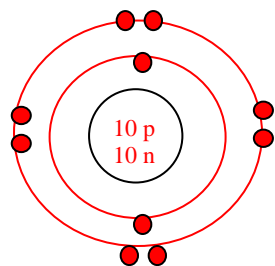
Atomic #	Number of protons	Number of electrons	Atomic mass
Increases from 11 to 18	Increases from 11 to 18	Increases from 11 to 18	Increases from 23 to 40 (except for Co to Ni where it decreases)

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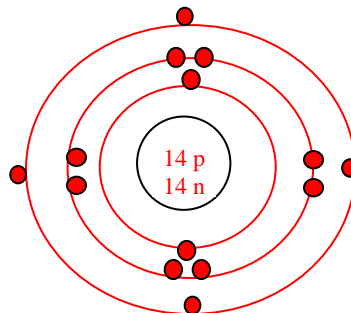
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12. Draw Bohr models for each of the following elements. Be sure to include the correct number of protons, neutrons and electrons. (the given circles are the atomic nuclei) (12)
 Use a **p** for proton, **n** for neutron and **e** for electron

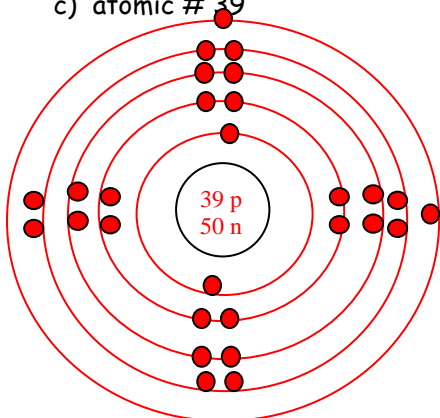
a) Ne



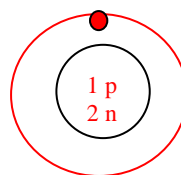
b) mass number 28



c) atomic # 39



d) Tritium (hydrogen-3)



13. In your own words and with reference to a specific example, describe how an ionic bond forms.(2)
A metal atom like Na bumps into a non-metal atom like Cl. Na TRANSFERS its 1 valence electron to Cl valence shell, which is missing an electron. The Na atom becomes an ion with a +1 charge and is attracted to the Cl, which has become an ion with a -1 charge. Opposite charges attract an attractive force develops between the two ions resulting in an ionic bond.

14. In your own words and with referenced to a specific example describe how a covalent bond forms(2)
With added heat and pressure, two non-metal atoms (i.e. carbon and oxygen) overlap their valence orbits and SHARE electrons to create complete outer shells.

15. Complete the following table (6)

Compound formula	Type of compound (ionic or covalent)	# of elements	# of atoms
Mn_3O_2	Ionic	2	5
$OS_2(CO_3)_4$	Ionic	3	18
$C_2H_{12}O_6$	Covalent	3	20

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16. Write the formula for the following (5):

- | | |
|--------------------------|--------------------------------|
| a) potassium chloride | KCl |
| b) lithium sulphide | Li ₂ S |
| c) nickel (III) sulphide | Ni ₂ S ₃ |
| d) silver nitrate | AgNO ₃ |
| e) magnesium hydroxide | Mg(OH) ₂ |
| f) gold (II) fluoride | AuF ₂ |
| g) lead (IV) oxide | PbO ₂ |
| h) sodium oxide | Na ₂ O |
| i) sodium acetate | NaCH ₃ COO |
| j) iron (II) sulphate | FeSO ₄ |

17. Write the name for the following compounds (5).

- | | |
|--|-----------------------|
| a) NaI | sodium iodide |
| b) K ₂ Cr ₂ O ₇ | potassium dichromate |
| c) CuSO ₄ | copper (II) sulphate |
| d) FeO | iron (II) oxide |
| e) Al(MnO ₄) ₃ | aluminum permanganate |
| f) K ₃ P | potassium phosphide |
| g) AgI | silver iodide |
| h) LiNO ₃ | lithium nitrate |
| i) Ni ₂ S ₃ | nickel (III) sulphide |
| j) Au ₂ O | gold (I) oxide |

18. Determine the number of atoms of each element in the following. (Remember to total each element!!) (5)

- | | | | | |
|---|-------|------|-----|--------|
| a) 3 H ₂ O ₂ | 6 H | 6 O | | |
| b) 7 Na ₂ O + 2H ₂ SO ₄ | 14 Na | 15 O | 4H | 2S |
| c) 9 C ₂ H ₅ O | 18C | 45H | 9O | |
| d) 3 C ₅ H ₁₀ O ₅ + H ₂ SO ₄ | 15C | 432H | 19O | 1S |
| e) 2 Na ₂ Cr ₂ O ₇ + 3KCl | 4Na | 4Cr | 14O | 3K 3Cl |

8. Write the name and the formula for the following combinations:

- | | |
|----------------------------|---|
| a) Magnesium & Fluorine: | Name magnesium fluoride |
| | Formula MgF ₂ |
| b) Aluminum & Sulphate: | Name aluminum sulphate |
| | Formula Al ₂ (SO ₄) ₃ |
| c) Ammonium & Oxygen: | Name ammonium oxide |
| | Formula (NH ₄) ₂ O |
| d) Nickel (III) & Bromine: | Name nickel (III) bromide |
| | Formula NiBr ₃ |

BONUS! Balance the following chemical equations: (+1)

- | |
|--|
| a) <u>4</u> Al + <u>3</u> O ₂ → <u>2</u> Al ₂ O ₃ |
| b) <u>1</u> Cu + <u>1</u> SnCl ₂ → <u>1</u> Sn + <u>2</u> CuCl |
| c) <u>1</u> K ₃ PO ₄ + <u>3</u> NaOH → <u>1</u> Na ₃ PO ₄ + <u>3</u> KOH |