

Chapters 3 & 4 Study Questions

1. What are two conclusions supported by Rutherford's experiment?

2. Fill in the following table:

Nuclear Symbol	Atomic Number	Mass Number	Number of Protons	Number of Electrons	Number of Neutrons	Charge
${}_{18}^{40}\text{Ar}$	_____	_____	_____	_____	_____	_____
_____	_____	39	19	18	_____	_____
_____	16	_____	_____	_____	20	-2

3. Write the nuclear symbols for the isotopes of neon which contain 10 neutrons and 12 neutrons.

4. For each of the following elements, indicate whether it is a main group element (MG), transition metal (TM), or inner transition metal (ITM). If the element is a main group element, indicate the group number and whether it is a metal, a nonmetal or a metalloid. Also indicate the Period of each element.

- | | | |
|---------------------|---------------------|---------------------|
| a) Sr (atomic # 38) | b) Br (atomic # 35) | c) Mo (atomic # 42) |
| d) P (atomic # 15) | e) B (atomic # 5) | f) U (atomic # 92) |
| g) Sn (atomic # 50) | h) Hg (atomic # 80) | |

5. Provide the common names of Groups 1, 2, 17 and 18.

6. Give an example of

- | | |
|---------------------------------|---------------------------------|
| a) an element made of molecules | b) a compound made of molecules |
| c) a compound made of ions | |

7. For each of the following atoms, indicate whether it forms a positive or a negative ion, and include the ion charge.

- | | | | | |
|-------|-------|-------|------|-------|
| a) Na | b) Ba | c) Cl | d) S | e) Ag |
|-------|-------|-------|------|-------|

8. Which of the following are ionic compounds? Which are covalent compounds? Name each compound.

- | | | | | |
|--------------------------|-------------------------------|----------------------------|--------------------|-----------------|
| a) N_2O | b) K_2O | c) PCl_3 | d) AlPO_4 | e) HCl |
| f) NH_4F | g) $\text{Pb}(\text{NO}_2)_2$ | h) H_2SO_3 | | |

9. Name the following ionic compounds:

- | | | | |
|--------------------|-----------------|------------------|--------------------------------|
| a) CaCO_3 | b) ZnS | c) CuOH | d) $\text{Mg}(\text{ClO}_4)_2$ |
|--------------------|-----------------|------------------|--------------------------------|

10. Give the formulas for the following ionic compounds:

- a) potassium phosphate b) ammonium sulfate
c) cobalt(II) hydroxide d) iron(III)nitride

11. Provide the formulas for the following covalent compounds:

- a) phosphorus triiodide b) dinitrogen pentoxide c) chloric acid

Summary of Chapter 3: Elements, Atoms, and Ions

element symbols

atomic theory

law of constant composition

elements

atoms

compounds

chemical formulas

Rutherford's experiment

structure of atom

nucleus

protons, electrons, neutrons

atomic number, mass number

isotopes

nuclear symbol

periods & groups

regions of the Periodic Table: main groups, transition metals, inner transition metals

noble gases, halogens, alkali metals, alkaline earth metals

metals, nonmetals, metalloids

ionic & covalent compounds

molecules

diatomic molecules

allotropes

ions

formulas for ionic compounds

Summary of Chapter 4: Nomenclature

naming binary ionic compounds

Type I (no roman numeral)

Type II (roman numeral)

naming binary covalent compounds

polyatomic ions

naming ionic compounds involving polyatomic ions

naming acids

writing formulas from names