



Chemistry

Name: _____

Section _____ Chapter 5 Study Sheet Date: _____

A. Multiple Choice:

- According to the modern model of the atom, the nucleus of an atom is surrounded by one or more
(1) **electrons** (2) neutrons (3) positrons (4) protons
- Which electron configuration represents the electrons in an atom of Ga in an excited state?
(1) 2-8-17-3 (2) **2-8-17-4** (3) 2-8-18-3 (4) 2-8-18-4
- A specific amount of energy is emitted when excited electrons in an atom in a sample of an element return to the ground state. This emitted energy can be used to determine the
(1) mass of the sample (3) **identity of the element**
(2) volume of the sample (4) number of moles of the element
- According to the wave-mechanical model, an orbital is defined as the
(1) circular path for electrons
(2) circular path for neutrons
(3) **most probable location of electrons**
(4) most probable location of neutrons
- The valence electron of which atom in the ground state has the greatest amount of energy?
(1) **cesium** (2) lithium (3) rubidium (4) sodium
- The numbers of protons and neutrons in each of four different atoms are shown in the table to the right

**Protons and Neutrons in
Four Different Atoms**

Atom	Number of Protons	Number of Neutrons
A	8	8
D	9	9
E	9	10
G	10	10

Which two atoms represent isotopes of the same element?

- (1) A and D (2) A and G (3) **E and D** (4) E and G
- The mass of a proton is approximately equal to
(1) **1 atomic mass unit** (3) the mass of 1 mole of carbon atoms
(2) 12 atomic mass units (4) the mass of 12 moles of electrons
 - Which electron shell contains the valence electrons of a radium atom in the ground state?
(1) the sixth shell (3) **the seventh shell**
(2) the second shell (4) the eighteenth shell

9. Which Lewis electron-dot diagram represents a fluorine atom?

- (1) $\text{:}\ddot{\text{F}}\text{:}$ (2) $\cdot\ddot{\text{F}}\cdot$ (3) $\cdot\ddot{\text{F}}\text{:}$ (4) $\cdot\ddot{\text{F}}\cdot$

10. Each diagram below represents the nucleus of an atom.



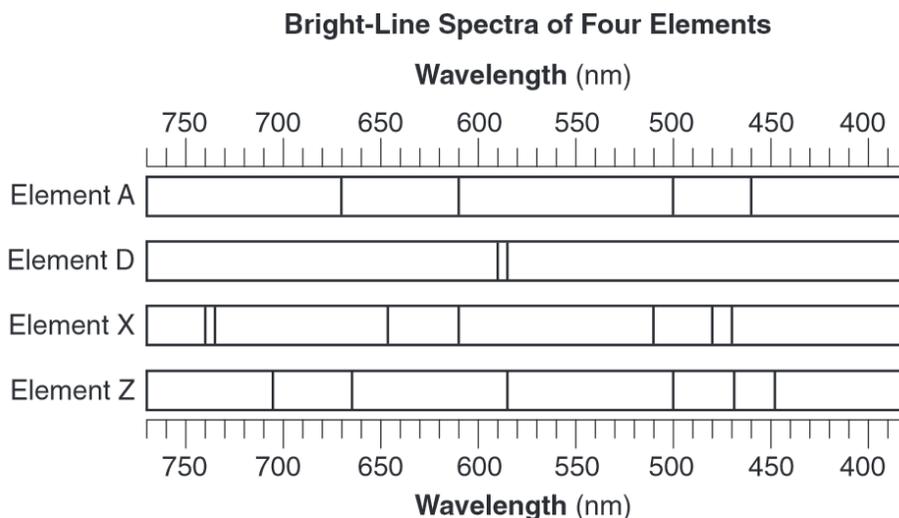
How many different elements are represented by the diagrams?

- (1) 1 (2) 2 (3) 3 (4) 4

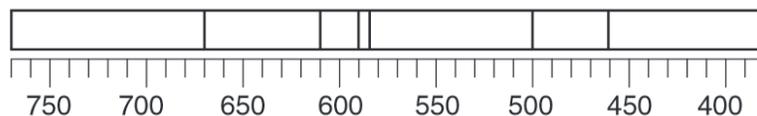
B. Short Answer: Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Chemistry*.

Base your answers to questions 1 and 2 on the information below and on your knowledge of chemistry.

The bright-line spectra produced by four elements are represented in the diagram below.



Given the bright-line spectrum of a mixture formed from two of these elements:



1. Which elements are present in this mixture? [2]

Elements A and D are present in the mixture.

2. Identify element D. [2]

The two lines at 585 indicate the presence of sodium (Na).

Base your answers to questions 3 through 6 on the information below and on your knowledge of chemistry.

A student compares some models of the atom. These models are listed in the table below in order of development from top to bottom.

Models of the Atom

Model	Observation	Conclusion
Dalton model	Matter is conserved during a chemical reaction.	Atoms are hard, indivisible spheres of different sizes.
Thomson model	Cathode rays are deflected by magnetic/electric fields.	Atoms have small, negatively charged particles as part of their internal structure.
Rutherford model	Most alpha particles pass straight through gold foil but a few are deflected.	An atom is mostly empty space with a small, dense, positively charged nucleus.
Bohr model	Unique spectral lines are emitted by excited gaseous elements.	Packets of energy are absorbed or emitted by atoms when an electron changes shells.

3. State the model that first included electrons as subatomic particles. [2]

The Thomson model first included electrons (the negatively charged particles).

4. State *one* conclusion about the internal structure of the atom that resulted from the gold foil experiment. [2]

Either 'An atom is mostly empty space.' or 'atoms have small, dense, positively charged nuclei' or both.

5. Using the conclusion from the Rutherford model, identify the charged subatomic particle that is located in the nucleus. [2]

Since the nucleus is positively charged, it contains protons.

6. State *one* way in which the Bohr model agrees with the Thomson model. [2]

Both models include negatively charged particles.

Base your answers to questions 7 through 10 on the information below and on your knowledge of chemistry.

The atomic radius and ionic radius for some Group 1 and some Group 17 elements are given in the tables below.

Atomic and Ionic Radii of Some Elements

Group 1

Particle	Radius (pm)
Li atom	130.
Li ⁺ ion	78
Na atom	160.
Na ⁺ ion	98
K atom	200.
K ⁺ ion	133
Rb atom	215
Rb ⁺ ion	148

Group 17

Particle	Radius (pm)
F atom	60.
F ⁻ ion	133
Cl atom	100.
Cl ⁻ ion	181
Br atom	117
Br ⁻ ion	?
I atom	136
I ⁻ ion	220.

7. Estimate the radius of a Br ion. [2]

Between 181 and 220 pm.

8. Explain, in terms of electron shells, why the radius of a K atom is greater than the radius of an Na atom. [2]

K atoms have one more electron shell than Na atoms.

9. Write *both* the name and the charge of the particle that is gained by an F atom when the atom becomes an F ion. [2]

The negatively charged particle gained by an F atom to form an F ion is an electron.

10. State the relationship between atomic number and atomic radius as the elements of Group I are considered in order of increasing atomic number. [2]

As atomic number increases the radius of the Group I elements increases from top to bottom.