

WARMUP:

Label the following particle diagrams as either: element, compound, or mixture.

- Circle the diagram that *cannot* be decomposed (broken down) by chemical change.
- Put a star next to the diagram that *can* be separated by physical means.

Review Task

- Select an isotope abundance table.
- On a plate, you will create a model of the **most abundant isotope** of the element you selected. Your model should include/label:
 - The nucleus
 - The number of protons, neutrons, and electrons in the NEUTRAL atom
 - Electrons configured in the appropriate number of electron shells, with the HIGHEST energy shell/electrons labeled
 - The names of the scientists who discovered a) the nucleus and b) the electron
 - The atomic number, nuclear and net charge, and identity of the element
- BEFORE you create your model: fill in the table below and check in with Miss Virga; she will then bring you a plate.

Identity of element	
Atomic Number	
Nuclear Charge	
Net Charge	
Mass Number	
Number of protons	
Number of neutrons	
Number of electrons	



- On the back of your model atom, tape down the isotope abundance table.
 - Show a numerical setup for determining the average atomic mass of the element (this is the one formula that is NOT on Table T!)
 - How is average atomic mass different from mass number?

weighted avg of all isotopes → # of protons + neutrons in one isotope

5. Below your numerical setup, describe how your atom would emit a characteristic light spectrum. Your answer MUST discuss **electrons, energy states, and energy emission**. Include diagrams if it helps you explain the concept. **atoms release light when electrons**

6. In the space below, compare the atomic radius of your element to its ionic radius.

If your atom forms \oplus ions, $AR > IR$

If your atom forms \ominus ions, $IR > AR$

go from excited \rightarrow ground state

How is this comparison DIFFERENT to comparing the atomic radii of elements within the same group or period? Where can you find that information for comparison purposes?

use Table S!

7. Answer these need-to-know Regents questions (from June 2013). CHECK your answers!

1 According to the wave-mechanical model of the atom, an orbital is a region of the most probable location of

- (1) an alpha particle (3) an electron
(2) a gamma ray (4) a proton

2 Which particles have approximately the same mass?

- (1) an electron and an alpha particle
(2) an electron and a proton
(3) a neutron and an alpha particle
(4) a neutron and a proton

5 Which quantity can vary among atoms of the same element?

- (1) mass number
(2) atomic number
(3) number of protons
(4) number of electrons

6 Which substances have atoms of the same element but different molecular structures?

- (1) He(g) and Ne(g) (3) K(s) and Na(s)
(2) O₂(g) and O₃(g) (4) P₄(s) and S₈(s)

7 An atom that has 13 protons and 15 neutrons is an isotope of the element

- (1) nickel (3) aluminum
(2) silicon (4) phosphorus

8 Which elements have the most similar chemical properties?

- (1) Si, As, and Te (3) Mg, Sr, and Ba
(2) N₂, O₂, and F₂ (4) Ca, Cs, and Cu

3 During a flame test, a lithium salt produces a characteristic red flame. This red color is produced when electrons in excited lithium atoms

- (1) are lost by the atoms
(2) are gained by the atoms
(3) return to lower energy states within the atoms
(4) move to higher energy states within the atoms

4 Compared to the energy and charge of the electrons in the first shell of a Be atom, the electrons in the second shell of this atom have

- (1) less energy and the same charge
(2) less energy and a different charge
(3) more energy and the same charge
(4) more energy and a different charge

32 What is the overall charge of an ion that has 12 protons, 10 electrons, and 14 neutrons?

- (1) 2- (3) 4- +12
(2) 2+ (4) 4+ -10

33 As the elements in Period 3 are considered in order of increasing atomic number, there is a general decrease in

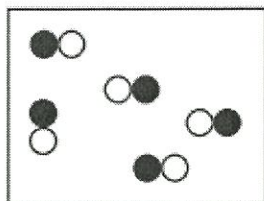
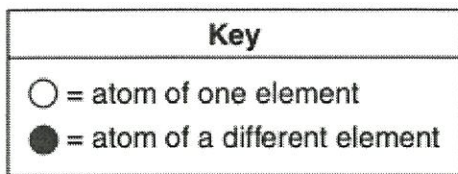
- (1) atomic mass
(2) atomic radius
(3) electronegativity
(4) first ionization energy

34 Which electron configuration represents the electrons of a sulfur atom in an excited state?

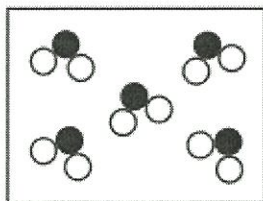
- (1) 2-6-6 (3) 2-8-4
(2) 2-7-7 (4) 2-8-6 *ground*

2-8-6

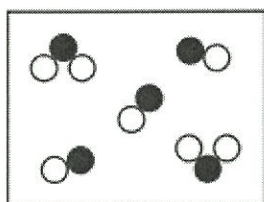
42 Which particle diagram represents a sample of matter that can not be broken down by chemical means?



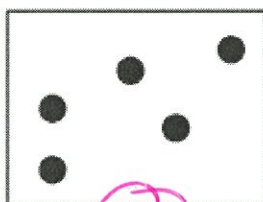
(1)



(3)



(2)



(4)

Neon 2-8

52 In the ground state, which noble gas has atoms with the same electron configuration as a magnesium ion? [1]

~~Argon~~

~~(2-8-8)~~

53 Explain, in terms of electrons, why an atom of a metal forms an ion that has a smaller radius than its atom. [1]

when metals form ions,
electrons are lost.

