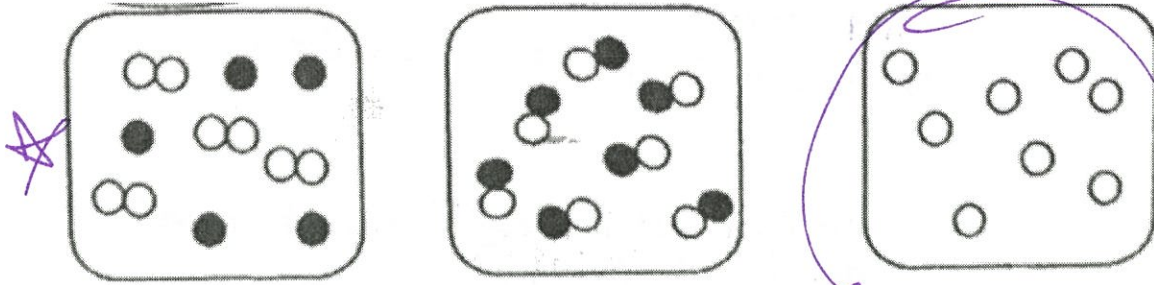


WARMUP:

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 Mrs. Young; she will then bring you a plate.

Identity of element	S	Mg	Cl	Al
Atomic Number	16	12	17	13
Number of protons	16	12	17	13
Number of neutrons	16	12	18	14
Number of electrons	16	12	17	13
Nuclear Charge	+16	+12	+17	+13
Net (overall) Charge	0	0	0	0
Mass Number	32	24	35	27

Teacher check:

- 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?

*20 mass S, Cl, Al = 2
Mg = 3*

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

Metal = larger than ion
 non-metal = smaller than ion

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?

ion radii not in ref. table & based on gaining or losing e⁻
 atomic radius on table within period or group

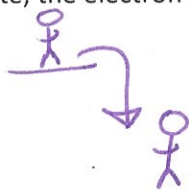
7. Answer these need-to-know Regents questions (from June 2014). CHECK your answers!

1. 4 Compared to the charge of a proton, the charge of an electron has (table 0)
- (1) a greater magnitude and the same sign (2) a greater magnitude and the opposite sign
 (3) the same magnitude and the same sign (4) the same magnitude and the opposite sign

2. 3 Which atom has the largest atomic radius? table 5
- (1) potassium (2) rubidium (3) francium (4) cesium

3. 2 In the wave-mechanical model of the atom, an orbital is defined as
- (1) a region of the most probable proton location ~~X~~
 (2) a region of the most probable electron location
 (3) a circular path traveled by a proton around the nucleus ~~X~~
 (4) a circular path traveled by an electron around the nucleus
 → orbit

4. 4 When an excited electron in an atom moves to the ground state, the electron
- (1) absorbs energy as it moves to a higher energy state
 (2) absorbs energy as it moves to a lower energy state
 (3) emits energy as it moves to a higher energy state
 (4) emits energy as it moves to a lower energy state



6. 2 The atomic mass of magnesium is the weighted average of the atomic masses of
- (1) all of the artificially produced isotopes of Mg
 (2) all of the naturally occurring isotopes of Mg — plate you made today
 (3) the two most abundant artificially produced isotopes of Mg
 (4) the two most abundant naturally occurring isotopes of Mg — electronegativity

12. 3 Which element has atoms with the strongest attraction for electrons in a chemical bond?
- (1) chlorine (2) nitrogen (3) fluorine (4) oxygen

19. 1 Which element is a liquid at STP? (1) bromine (2) cesium (3) francium (4) iodine



31. 4 Which notations represent different isotopes of the element sodium?

- (1) ^{32}S and ^{34}S (2) S^{2-} and S^{6+} (3) Na^+ and Na^+ (4) ^{22}Na and ^{23}Na

32. 2 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

2-8-18-3 = ground

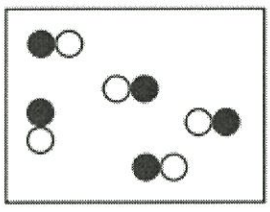
33. 3 Which statement describes the general trends in electronegativity and first ionization energy as the elements in Period 3 are considered in order from Na to Cl?

- (1) Electronegativity increases, and first ionization energy decreases.
 (2) Electronegativity decreases, and first ionization energy increases.
 (3) Electronegativity and first ionization energy both increase.
 (4) Electronegativity and first ionization energy both decrease.

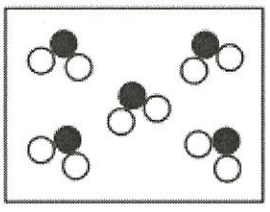
table S →

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

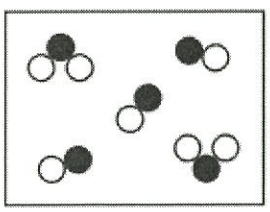
Key	
○	= atom of one element
●	= atom of a different element



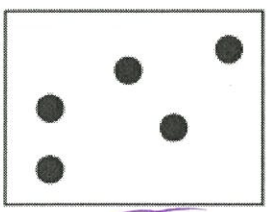
(1)



(3)



(2)



(4)

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

Mg = 2-8-2 → 2-8
lose 2

Ne

53 Explain, in terms of electrons, why the radius of a potassium atom is larger than the radius of a potassium ion in the ground state. [1]

Potassium atom has 19 e⁻ 2-8-8-1
 while potassium ion has 1 fewer e⁻ (18) 2-8-8

