

Key

Unit 2 Test Review: Atomic Structure

ATOMIC THEORY:

model - representation of reality
theory - statement explaining a phenomenon

1. What is a model? A theory?
2. Name the 5 people who were instrumental in the development of atomic theory and what they discovered.

Democritus - first proposed atoms
Dalton - Atomic theory
JJ Thompson - discovered electron (cathode ray tube)
Ernest Rutherford - atoms mostly space (gold foil)
James Chadwick - discovered neutrons

PARTS OF THE ATOM:

1. What are the parts of the atom? Where are they located in the atom and what is their charge?

protons \oplus nucleus
electrons \ominus orbitals
neutrons no charge nucleus

2. Which part gives the identity of the atom?
3. Which part(s) make up most of the (atomic) mass of the atom? Which makes up very little?
4. What does the periodic table tell us about the parts of the atom:

Protons
Protons and Neutrons - mass
electrons - no mass

- a. Find the following for the atoms Aluminum, Chlorine, and Magnesium:

	Al-13	Cl-17	Mg-12
i. Atomic #	13	17	12
ii. # of protons	13	17	12
iii. # of electrons	13	17	12
iv. Average atomic mass	27	35.5	24
v. Name of the group it is in (NOT the #)	Aluminum Group	Halogens	Alkaline Earth Metals
vi. # of valence electrons	3	7	2
vii. # of core electrons	10	10	10
viii. # of neutrons for 2 of its isotopes			
ix. Draw the 2 isotopes of the atom			

5. ~~Go back to the PhET simulation lab and play the games to help you study!~~

ISOTOPE NOTES:

1. What is an isotope? Same # of protons, Different # of neutrons.
2. Why is the average atomic mass on the periodic table a decimal number?
It is an average of all the isotopes of an element.
3. What are the 2 ways to represent isotopes of an atom? What does each part in the symbol mean?
Chlorine-35
 $^{35}_{17}\text{Cl}$
35 is the mass #
17 is the atomic #
4. ~~Write out the isotope symbol for 2 isotopes of Gallium, Bromine, and Rubidium. Which of the 2 isotopes is more abundant? How do you know?~~

NUCLEAR CHEMISTRY:

1. What are the characteristics of isotopes?

melting point
boiling point
Density
} will all be different in isotopes of the same element.

2. What is nuclear chemistry? Name the 3 types of nuclear changes that can occur in an atom.
Study of the changes in the nucleus of an atom. Alpha, Beta, and Gamma
3. What do all nuclear changes have in common?
A change in the nucleus making it more stable.
4. How do you protect yourself from the 3 types of radioactive decay?

Alpha - paper

Gamma - Dense metal (Pb) concrete

NUCLEAR REACTIONS:

Beta - clothing, thin metal

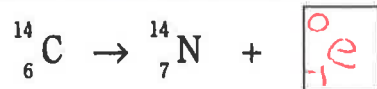
1. Describe in detail the 4 types of nuclear processes. (Questions #2 in the Nuclear Reactions notes) ~~What happens in each process? What type of new element is made?~~
2. Check out this website for practice with nuclear reaction equations:
<http://www.sciencegeek.net/Chemistry/taters/Unit1NuclearEquations.htm>
3. Complete the following nuclear equations:

Identify the missing atomic nuclei or radiation particles in the following nuclear equations:

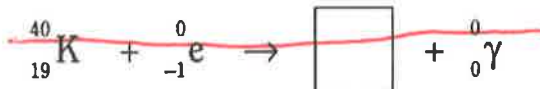
1. Alpha decay of radium-226, the most abundant isotope of radium



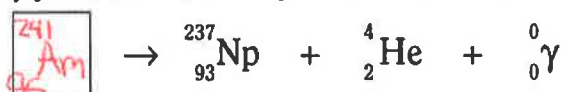
2. Radioactive decay of carbon-14, which is used in radiocarbon dating



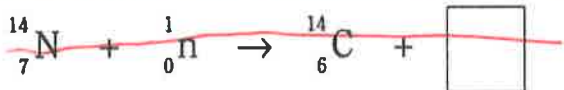
3. ~~"Electron capture" by potassium-40, a natural source of radiation in the human body~~



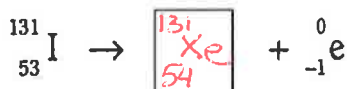
4. Alpha decay of the artificially produced radioisotope that is used in smoke detectors



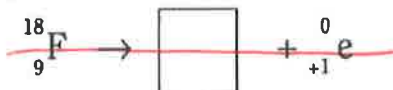
5. ~~Formation of radioactive carbon-14 in the upper atmosphere by reaction with cosmic rays~~



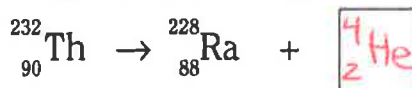
6. Beta decay of iodine-131, which is used to treat thyroid cancer



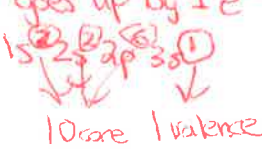
7. ~~"Positron" emission by fluorine-18, which is used in PET scans to study brain function~~



8. Radioactive decay of thorium-232 used in incandescent gas "lantern mantles"

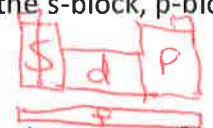


ELECTRON ORGANIZATION:

- How are electrons arranged in an atom? *Shells 2-8-18*
- How many electrons are allowed in each of the first 5 energy shells? *up to 32*
- Which energy shell has the lowest energy? Highest energy? *s, f*
- Describe the organization of electrons into subshells. *2e⁻ with opposite spins*
- How does the periodic table tell us about electron arrangement? *Each element goes up by 1 e⁻*
- How do you find the number of valence and core electrons in an atom? *Ex. Na 1s² 2s² 2p⁶ 3s¹*

- Answer the following for the atoms of Carbon, Barium, and Bromine:

	C	Ba	Br
a. How many total electrons does it have?	6	56	35
b. How many valence electrons are there?	4	2	7
c. How many core electrons are there?	2	54	28
d. How many shells will it have?	2	6	4

ELECTRON CONFIGURATIONS:

- Describe how electrons are arranged in shells, subshells, and orbitals. How many electrons does each hold? *Just know how to write electron configurations*
- What is ground state? Describe the aufbau principle. *lowest energy state*
- Sketch a simple periodic table on your paper. Label the s-block, p-block, d-block and f-block. How many electrons can each of them hold? 
- What are electron configurations? *Address for electrons*
- Write the electron configuration for each of the following atoms: Be, Si, Tc, I and Cs. *s-2e⁻, p-6e⁻, d-10e⁻, f-14e⁻*

Be-1s²2s² Si-[Ne]3s²3p² Tc-[Kr]5s²4d⁵ I-[Kr]5s²4d¹⁰5p⁵

LAB QUESTIONS:

- ~~Barium~~ *Candium* Lab: Be sure you know how to calculate the average atomic mass and percent abundance for isotopes of an atom. *Cs-[Xe]6s¹ See Atomic Mass worksheet.*
- Flame Test Lab: Be sure you know which color flames the atoms tested in this lab make. *Not on test*

TOPICS FROM UNIT 1 THAT MAY BE ON THE TEST:

- ~~Volume measurements~~
- ~~Sig figs~~
- Chemical symbols
- NAMES for groups 1A, 2A, 3B-12B, 7A and 8A
- Periodic Table Trends