GreatHearts Irving

Remote Learning Packet

Please submit scans of written work in Google Classroom at the end of the week.

Week 7: May 11-15, 2020

Course: 10 Chemistry

Teacher(s): Ms. Oostindie megan.oostindie@greatheartsirving.org

Weekly Plan:

Monday, May 11

☐ Isotopes review worksheet

Tuesday, May 12

☐ Read 11.1(pp. 333-334) and take notes

☐ Balancing nuclear equations worksheet

Wednesday, May 13

☐ Read 11.2 (pp. 334-335) and take notes

☐ Watch "History of the Discovery of Radioactivity" video

Thursday, May 14

☐ Read 11.4 (stopping after gamma emission) and take notes

☐ Diagram the three types of nuclear decay

Friday, May 15

☐ Attend office hours

☐ Catch-up or review the week's work

Statement of Academic Honesty

I affirm that the work completed from the packet is mine and that I completed it independently.

I affirm that, to the best of my knowledge, my child completed this work independently

_____

Student Signature

_____

Parent Signature

Monday, May 11

Complete the attached worksheet titled "Isotopes." This is a review of material we have already covered in class. If you need to reference your textbook, isotopes can be found in chapter 3, section 3 (pp. 54-55). The key to this worksheet is also attached for you to self-grade your material.
*No material will be turned in from this day.

Tuesday, May 12

Read 11.1 (pp. 333-334) in your textbook. Your notes should include bolded vocabulary, sample equations, and the differences between chemical and nuclear reactions.

Complete the balancing nuclear equations worksheet. You will self-grade the first two questions in a different color pen.
*The balancing nuclear equations worksheet will be turned in.

Wednesday, May 13

Read 11.2 (pp. 334-335) in your textbook. Your notes should include bolded vocabulary and a drawing of Figure 11.1. In your notes, outline the three major discoveries of the nature of radioactivity. Include the name of the scientist(s), year of discovery, and a summary of their discovery.

Watch the "History of the Discovery of Radioactivity" video found on Google Classroom to aid you in your note taking.
*No material will be turned in from this day.

Thursday, May 14

Read 11.4 through the section titled "Gamma Emission" (pp. 336-339). Your notes should include bolded vocabulary, worked examples, and a nuclear equation for each of the three types of nuclear decay: alpha, beta, and gamma.

On a separate sheet of paper, diagram the three types of nuclear decay. You may draw simplified versions of Figure 11.3. Label your diagrams.
*Diagrams will be turned in.

Friday, May 15

Use this day to attend office hours, catch up on work from this week, scan your documents, and enjoy the start of your weekend! *You do not need to include notes in your packet submission*, only the documents listed: balancing nuclear equations worksheet and nuclear decay diagrams.

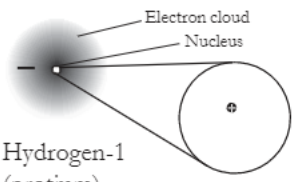
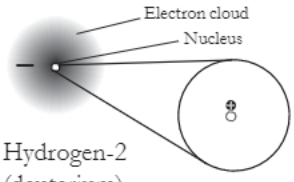
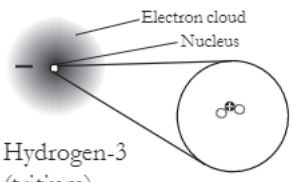
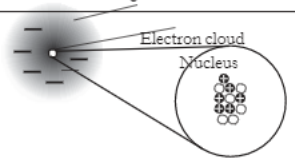
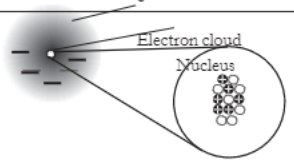
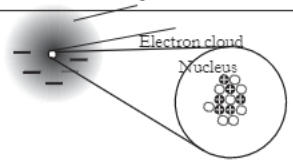
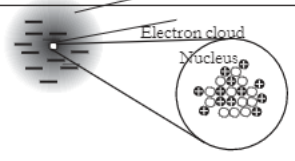
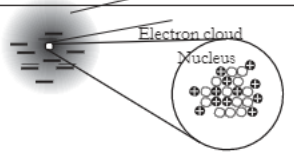
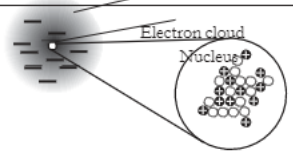
Isotopes

Are all atoms of an element alike?

Why?

The following activity will help you learn the important structural characteristics of an atom. How do we classify atoms? How does the combination of subatomic particles affect the mass and charge of an atom? What are isotopes? This is just a sampling of what we will address. Throughout this activity you will want to keep both Model 1 and a periodic table handy.

Model 1

Isotopes of Hydrogen			
Isotope Symbol	$^{1}_{1}H$	$^{2}_{1}H$	$^{3}_{1}H$
Atomic Diagram with Name	 Hydrogen-1 (protium)	 Hydrogen-2 (deuterium)	 Hydrogen-3 (tritium)
Number of Protons ⊕			
Number of Neutrons O			
Isotopes of Carbon			
Isotope Symbol	$^{12}_{6}C$	$^{13}_{6}C$	$^{14}_{6}C$
Atomic Diagram with Name	 Carbon-12	 Carbon-13	 Carbon-14
Number of Protons ⊕			
Number of Neutrons			
Isotopes of Magnesium			
Isotope Symbol	$^{24}_{12}Mg$	$^{25}_{12}Mg$	$^{26}_{12}Mg$
Atomic Diagram with Name	 Magnesium-24	 Magnesium-25	 Magnesium-26
Number of Protons ⊕			
Number of Neutrons O			

1. Refer to Model 1. What subatomic particles do the following symbols represent in the Atomic Diagrams?

2. Complete the table in Model 1 by counting the protons and neutrons in each atomic diagram. Divide the work evenly among group members.

3. Find the three elements shown in Model 1 on your periodic table.

   a. What whole number shown in Model 1 for each element is also found in the periodic table for that element?

   Hydrogen — Carbon — Magnesium —

   b. The whole number in each box of the periodic table is the atomic number of the element. What does the **atomic number** of an element represent?

   c. Refer to the isotope symbols in Model 1. Relative to the atomic symbol (H, C, or Mg), where is the atomic number located in the isotope symbol?

4. Refer to your periodic table.

   a. How many protons are in all chlorine (Cl) atoms?

   b. A student says "I think that some chlorine atoms have 16 protons." Explain why this student is not correct.

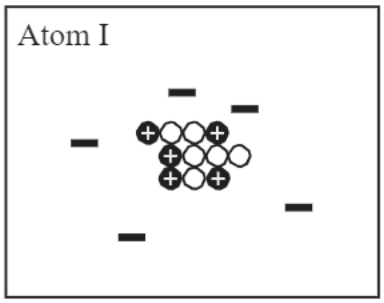
5. Refer again to Model 1. In the isotope symbol of each atom, there is a superscripted (raised) number. This number is also used in the name of the atom (*i.e.,* carbon-12). It is called the **mass number**.

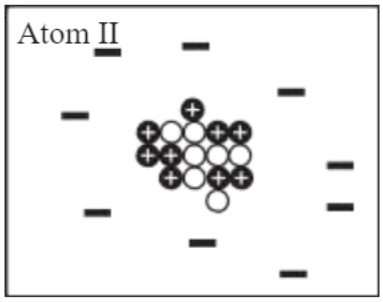
   a. How is the mass number determined?

   b. Why is this number called a "mass" number?

6. Fill in the table for Atom I and Atom II shown below.

	Atom I	Atom II
Number of Protons		
Number of Neutrons		
Mass Number		





7. Refer to Model 1.

   a. Which corner of the isotope symbol contains the mass number?

   b. How is the mass number of an isotope expressed in the name of an atom?

8. Write an isotope symbol (similar to those in Model 1) for each of the atoms in Question 6.

9. Write the name of the atom (similar to those in Model 1) for each of the atoms in Question 6.

10. Fill in the following table.

Isotope Symbol	$^{40}_{19}K$	$^{18}_{9}F$	
Atomic Number			16
Mass Number			
Number of Protons			
Number of Neutrons			15

11. Consider the examples in Model 1.

   a. Do all isotopes of an element have the same atomic number? Give at least one example or counter-example from Model 1 that supports your answer.

b. Do all isotopes of an element have the same mass number? Give at least one example or counter-example from Model 1 that supports your answer.

12. Considering your answers to Question 11, write a definition of **isotope** using a grammatically correct sentence. Your group must come to consensus on this definition.

13. Consult the following list of isotope symbols: $^{204}_{82}Pb$, $^{82}_{35}Br$, $^{78}_{35}Br$, $^{208}_{82}Pb$, $^{204}_{78}Pt$, $^{205}_{82}Pb$.

a. Which of the atoms represented by these symbols are isotopes of each other?

b. Which part(s) of the isotope symbol was the most helpful in answering part *a* of this question?

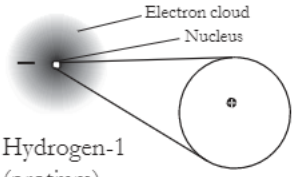
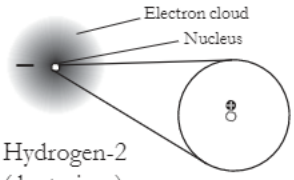
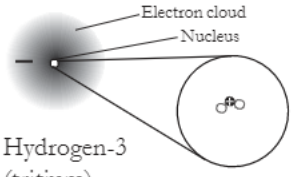
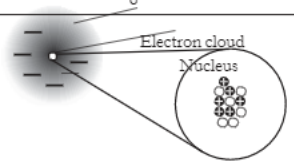
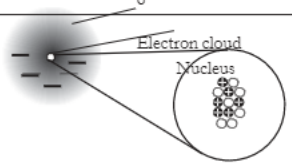
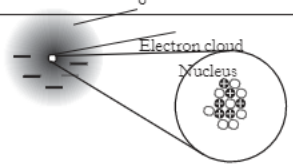
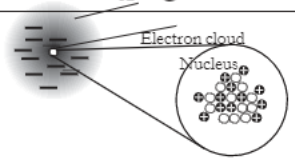
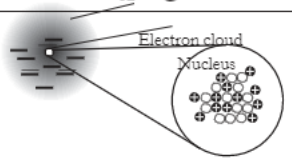
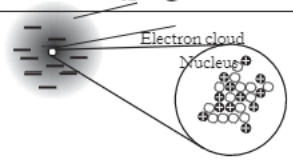
Isotopes

Are all atoms of an element alike?

Why?

The following activity will help you learn the important structural characteristics of an atom. How do we classify atoms? How does the combination of subatomic particles affect the mass and charge of an atom? What are isotopes? This is just a sampling of what we will address. Throughout this activity you will want to keep both Model 1 and a periodic table handy.

Model 1

Isotopes of Hydrogen			
Isotope Symbol	${}^{1}_{1}H$	${}^{2}_{1}H$	${}^{3}_{1}H$
Atomic Diagram with Name	 Hydrogen-1 (protium)	 Hydrogen-2 (deuterium)	 Hydrogen-3 (tritium)
Number of Protons ⊕	1	1	1
Number of Neutrons ○	0	1	2
Isotopes of Carbon			
Isotope Symbol	${}^{12}_{6}C$	${}^{13}_{6}C$	${}^{14}_{6}C$
Atomic Diagram with Name	 Carbon-12	 Carbon-13	 Carbon-14
Number of Protons ⊕	6	6	6
Number of Neutrons	6	7	8
Isotopes of Magnesium			
Isotope Symbol	${}^{24}_{12}Mg$	${}^{25}_{12}Mg$	${}^{26}_{12}Mg$
Atomic Diagram with Name	 Magnesium-24	 Magnesium-25	 Magnesium-26
Number of Protons ⊕	12	12	12
Number of Neutrons ○	12	13	14

1. Refer to Model 1. What subatomic particles do the following symbols represent in the Atomic Diagrams?

 electrons  protons  neutrons

2. Complete the table in Model 1 by counting the protons and neutrons in each atomic diagram. Divide the work evenly among group members.

3. Find the three elements shown in Model 1 on your periodic table.

   a. What whole number shown in Model 1 for each element is also found in the periodic table for that element?

   Hydrogen — 1 Carbon — 6 Magnesium — 12

   b. The whole number in each box of the periodic table is the atomic number of the element. What does the **atomic number** of an element represent?

   Atomic number represents the number of protons.

   c. Refer to the isotope symbols in Model 1. Relative to the atomic symbol (H, C, or Mg), where is the atomic number located in the isotope symbol?

   The atomic number is the subscript. ($_{12}Mg$)

4. Refer to your periodic table.

   a. How many protons are in all chlorine (Cl) atoms?

   There are 17 protons in all chlorine atoms.

   b. A student says "I think that some chlorine atoms have 16 protons." Explain why this student is not correct.

   If an atom had 16 protons, it would not be chlorine. Instead, that atom would be sulfur.

5. Refer again to Model 1. In the isotope symbol of each atom, there is a superscripted (raised) number. This number is also used in the name of the atom (*i.e.,* carbon-12). It is called the **mass number**.

   a. How is the mass number determined?

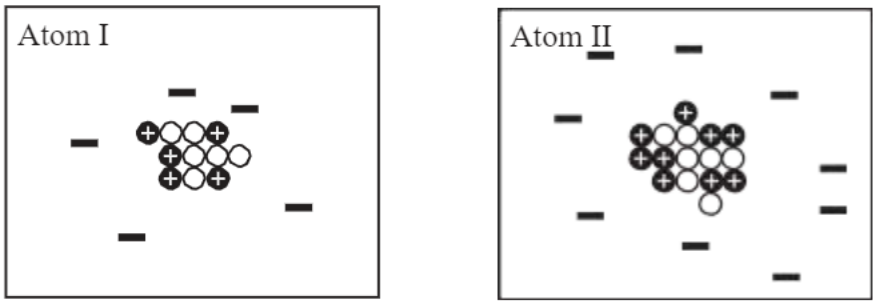
   Mass number is the number of protons and neutrons.

   b. Why is this number called a "mass" number?

   It is the mass of the nucleus of the isotope.

6. Fill in the table for Atom I and Atom II shown below.

	Atom I	Atom II
Number of Protons	5	9
Number of Neutrons	6	7
Mass Number	11	16



7. Refer to Model 1.

a. Which corner of the isotope symbol contains the mass number?

The top left corner of the symbol is the mass number.

b. How is the mass number of an isotope expressed in the name of an atom?

The mass number follows the name of an atom. (Carbon-12)

8. Write an isotope symbol (similar to those in Model 1) for each of the atoms in Question 6.

atom 1: $^{11}_{5}B$ atom 2: $^{16}_{9}F$

9. Write the name of the atom (similar to those in Model 1) for each of the atoms in Question 6.

atom 1: boron-5 atom 2: fluorine-16

STOP

10. Fill in the following table.

Isotope Symbol	$^{40}_{19}K$	$^{18}_{9}F$	$^{31}_{16}S$
Atomic Number	19	9	16
Mass Number	40	18	31
Number of Protons	19	9	16
Number of Neutrons	21	9	15

11. Consider the examples in Model 1.

a. Do all isotopes of an element have the same atomic number? Give at least one example or counter-example from Model 1 that supports your answer.

Yes, all the isotopes of hydrogen have one proton.

b. Do all isotopes of an element have the same mass number? Give at least one example or counter-example from Model 1 that supports your answer.

No, all the isotopes of hydrogen have different mass numbers.

12. Considering your answers to Question 11, write a definition of **isotope** using a grammatically correct sentence. ~~Your group must come to consensus on this definition.~~

Isotopes are different forms of an element that have different mass numbers based on their number of neutrons.

STOP

13. Consult the following list of isotope symbols: $_{82}^{204}Pb$, $_{35}^{82}Br$, $_{35}^{78}Br$, $_{82}^{208}Pb$, $_{78}^{204}Pt$, $_{82}^{205}Pb$.

a. Which of the atoms represented by these symbols are isotopes of each other?

$[_{82}^{204}Pb, _{82}^{208}Pb, _{82}^{205}Pb]$ $[_{35}^{82}Br, _{35}^{78}Br]$

b. Which part(s) of the isotope symbol was the most helpful in answering part *a* of this question?

The atomic number was most helpful in determining if the isotopes were of the same element.

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Balancing Nuclear Equations

Directions: Fill in the missing portion of the following nuclear equations. The first question has been completed for you as an example.

1. $^{212}_{84}Po \rightarrow {}^{208}_{82}Pb + {}^{4}_{2}He$

208 + 4 = 212

82 + 2 = 84

2. $^{125}_{53}I + {}^{0}_{-1}e \rightarrow$ ☐

3. $^{238}_{92}U \rightarrow$ ☐ $+ {}^{4}_{2}He$

4. ☐ $\rightarrow {}^{131}_{54}Xe + {}^{0}_{-1}e$

* check that all numbers on top and bottom total to the same amount on either side of the equation
* if the atomic number changes, so does the elemental symbol. $_{84}Po \rightarrow {}_{82}Pb$

KEY

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Balancing Nuclear Equations

Directions: Fill in the missing portion of the following nuclear equations. The first question has been completed for you as an example.

1. $^{212}_{84}Po \rightarrow {}^{208}_{82}Pb + {}^{4}_{2}He$

208 + 4 = 212

82 + 2 = 84

2. $^{125}_{53}I + {}^{0}_{-1}e \rightarrow {}^{125}_{52}Te$

3. $^{238}_{92}U \rightarrow {}^{236}_{90}Th + {}^{4}_{2}He$

4. teacher-graded $\rightarrow {}^{131}_{54}Xe + {}^{0}_{-1}e$

* check that all numbers on top and bottom total to the same amount on either side of the equation
* if the atomic number changes, so does the elemental symbol. $_{84}Po \rightarrow {}_{82}Pb$