

Student's learning activities (Ernest's Nuclear Atom)

Activity 1

You will watch a video with narration or listen to a story from your teacher about Ernest Rutherford and his model of the atom. Please write the most important points of the story according to your view and discuss them in your group. (Indicative important points for this story: relations between Rutherford, J.J. Thompson, Hans Geiger and Ernest Marsden, description of Geiger's experimental apparatus, process of the experiment, experimental results which guided Rutherford to change the model of J.J. Thompson, ways which the science is developed,...)

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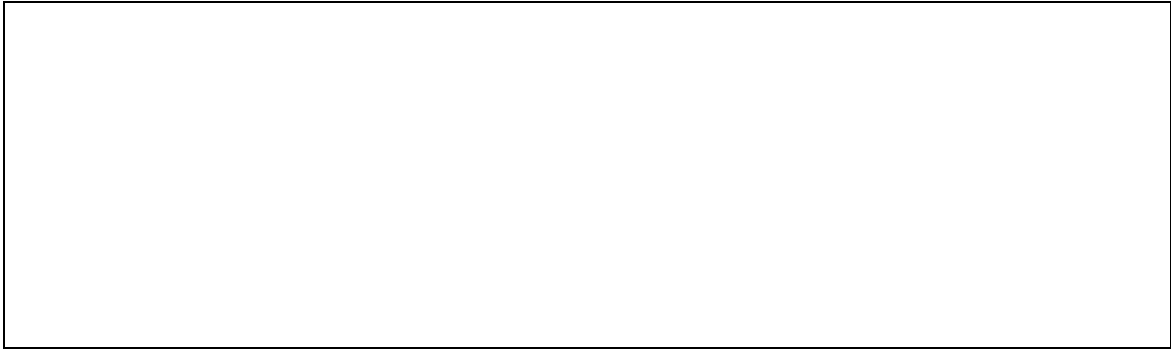
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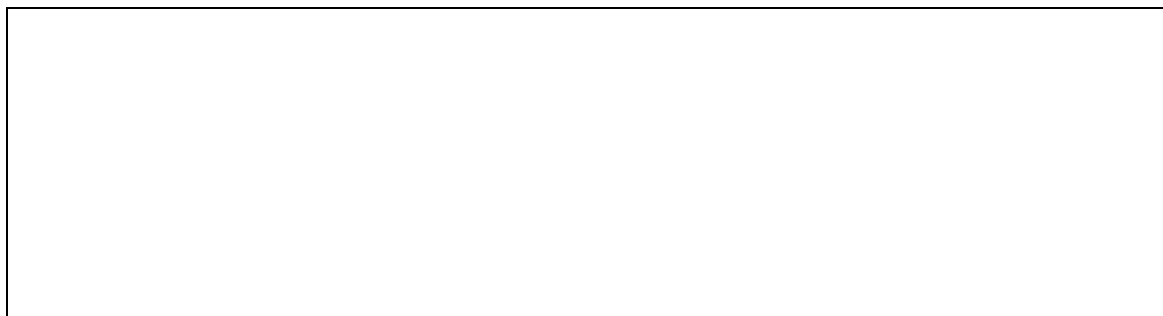
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Activity 2

Please make a sketch of Geiger's experimental apparatus, based on the narration.

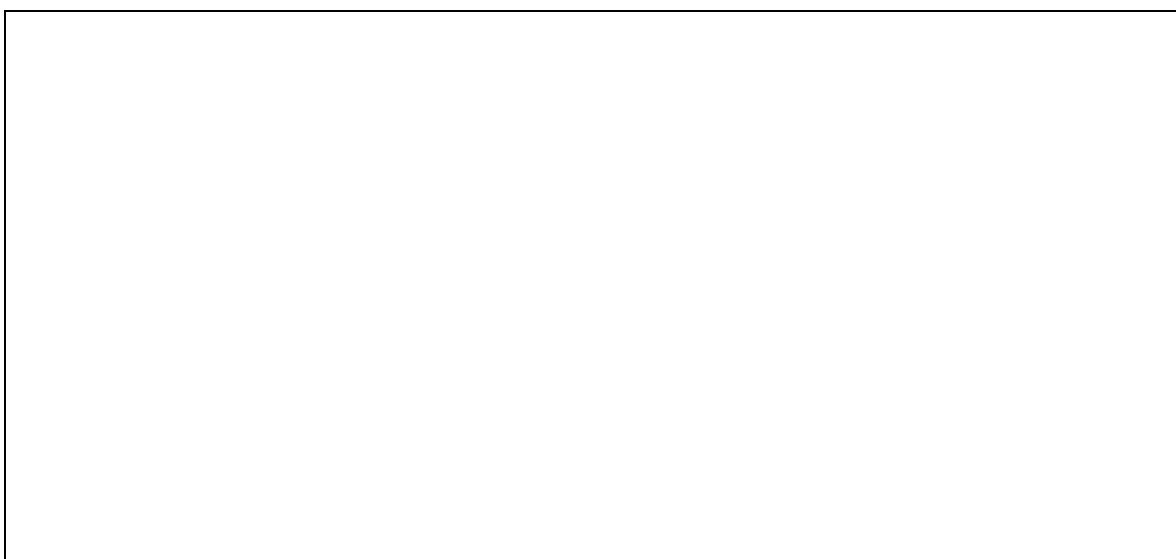
Please draw here:





Activity 3

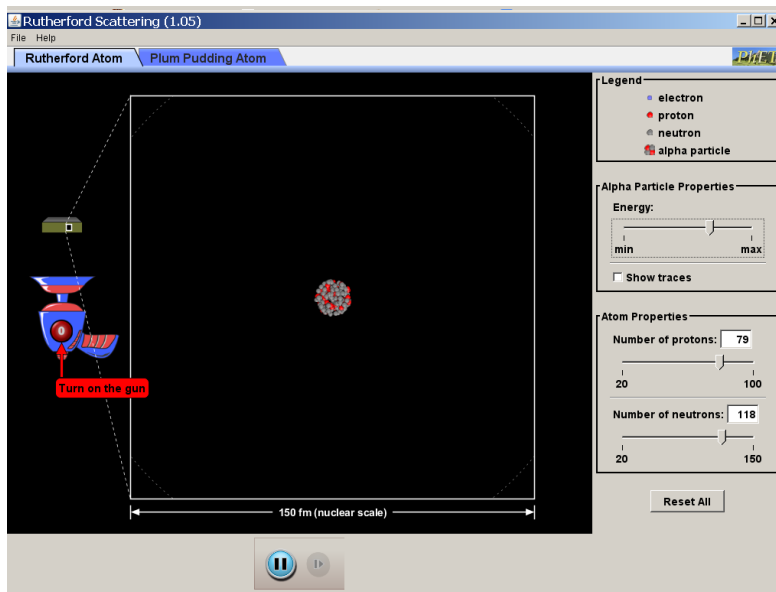
Please go to the electronic address <http://www.youtube.com/watch?v=kHaR2rsFNhg> and watch the presentation of Rutherford's experiment. On the basis of the information you will collect, correct the sketch you have designed for your previous activity. Draw the amended apparatus here:



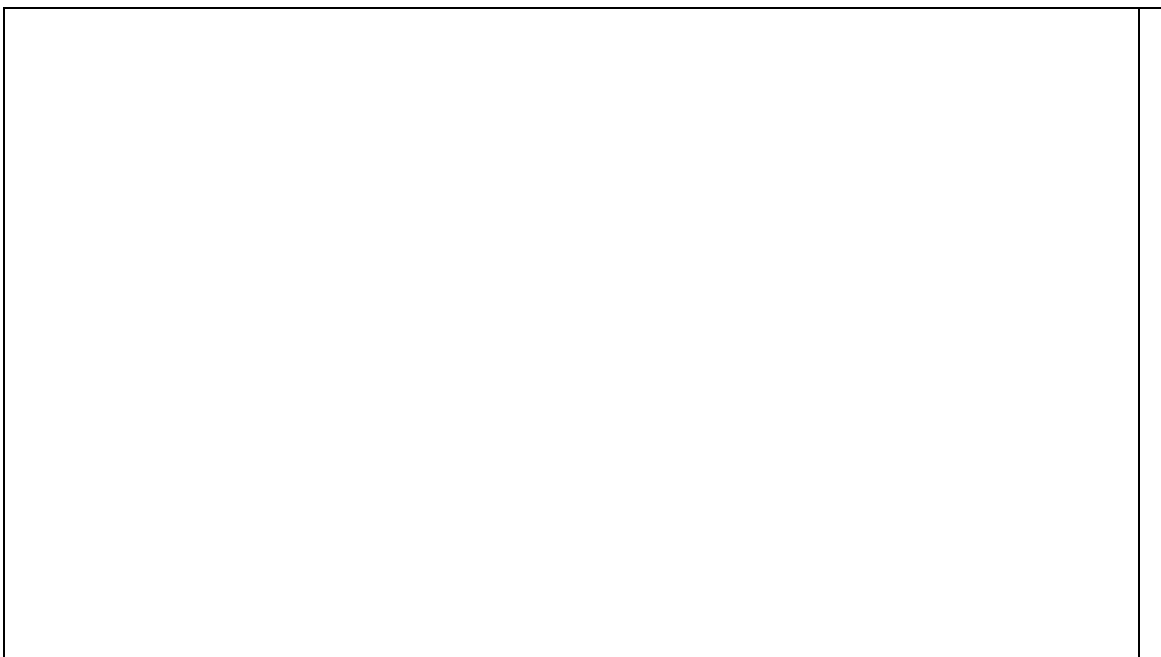
Activity 4

Please visit the website <http://phet.colorado.edu/en/simulation/rutherford-scattering>

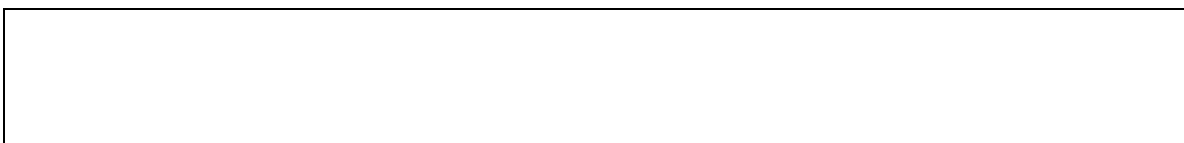
and download the relevant application. Activate it and study it carefully. Find the controls with which you can choose a model of the atom. Make visible the orbit and amend the energy of the alpha particles. You should also learn how to recognize the symbols for protons, electrons, neutrons and alpha particles.



1. Please choose the 'plum pudding model' and observe the orbit of the alpha particles. Draw a simple sketch in the space below to demonstrate the 'plum pudding' and the rotation of the alpha particles.



2. Please choose the Rutherford's model and observe the orbit of the alpha particles.





3. What do you predict that will happen if you increase the energy of the alpha particles that are launched towards the target? Please make the necessary adjustments in your controls and verify your predictions.

Which is your conclusion?

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Activity 5

Please discuss in your group the dialogues between Rutherford and Geiger. Based on them what conclusions can you draw about the function and the evolution of science? Write some of them.

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Activity 6

Using the list of ideas that describe the characteristics of science and the ways it develops, try to locate and write these ideas in the story you heard and the activities of this lesson. These ideas that scientists call Nature of Science (Nature Of Science-NOS-) are:

Characteristics of Nature of Science (NOS)

1. Science demands and relies on empirical evidence.
2. Knowledge production in science includes many common features and shared habits of mind.
3. Scientific knowledge is tentative but durable.
4. Laws and theories are related but distinct kinds of scientific knowledge.
5. Science is a highly creative endeavor.
6. Science has a subjective element.
7. There are historical, cultural, and social influences on science.
8. Science and technology impact each other, but they are not the same.
9. Science and its methods cannot answer all questions.

Scientists argue that in order to learn science one must first understand what exactly science is. Because it is difficult to define science, scientists give a list of its characteristics.

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Activity 7

Please compare the atomic model of Rutherford with the atomic model of Democritus.

1. Find and write the differences and similarities between the two atomic models.
2. Find and write the differences between the philosophical and scientific view.

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