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Middle - **S**enior **S**econdary

26mins

Bohr's Model of the Atom

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Suitable for:

Chemistry

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For Teachers:

Introduction

This program is aimed at Years 11 and 12 Chemistry students; some sections may be relevant to more able Year 10 students.

The program deals with how theories about the atom have developed. It looks at the ideas of Democritus, an ancient Greek philosopher, then those of Dalton, JJ Thompson, Rutherford and Bohr. Niels Bohr's life and work are outlined, showing how he came up with his atomic model. The advantages and shortcomings of the Bohr model are examined.

One sequence that could be used is:

- check what students know before they view the program,
- alert them to key words/terms
- watch the program, making notes on key terms
- discuss what is seen
- give out questions
- answer as many questions as possible
- watch program again, filling in missing answers/correcting
- go over student responses, correcting and filling in missed items.

DVD Timeline

00:00:00 Introduction
00:01:28 Historical Developments in Atom Theories
00:06:09 Summary
00:07:02 A Brief Outline of Bohr's Life
00:10:13 Summary
00:10:58 Bohr's Model in Detail 1
00:15:44 Summary
00:16:30 Bohr's Model in Detail 2
00:19:57 Summary
00:20:40 Beyond Bohr
00:23:22 Summary
00:24:09 Conclusion
00:25:36 End credits
00:26:15 Program end

Other Relevant Programs Available from VEA

Corrosion Chemistry
Acids and Bases
Atoms and Molecules - Physical Science in Action Series
Atomic Structure - Science Bank Series 2
The Good, the Bad & Beyond the Atom - Part 5 - Nobel's Greatest Hits Series

Student Worksheet:

Before Viewing the Program

Spend a few moments thinking about your knowledge of atoms and atomic theory. Then answer the following questions

1. What is meant by a “particle”?

   _____

   _____

2. What is an atom?

   _____

   _____

3. What is “matter”?

   _____

   _____

4. Name three particles that make up atoms.

   _____

   _____

5. Name two famous scientists who had theories about atoms.

   _____

   _____

While Viewing the Program

Have a pen/pencil and paper ready. Consider the following terms:
Democritus, Dalton, atom, Thomson, Rutherford, orbit, spectrum, Bohr, nuclear, alpha particle, electron, proton, random, kinetic energy, shell, valence, ground state, excited, quantum, photon, emit,

As the program plays, as these terms occur, jot down a quick thought about them.

1. Democritus _____

   _____

2. Dalton _____

   _____

3. atom _____

   _____

4. Thomson _____

   _____

5. Rutherford _____

   _____

6. orbit _____

   _____

7. spectrum _____

   _____

8. Bohr _____

   _____

9. nuclear _____

   _____

10. alpha particle _____

    _____

11. electron _____

    _____

12. proton _____

    _____

13. random _____

    _____

14. kinetic energy _____

_____

15. shell _____

_____

16. valence _____

_____

17. ground state _____

_____

18. excited _____

_____

19. quantum _____

_____

20. photon _____

_____

21. emit _____

_____

After Viewing the Program

1. Give the name of the person who first came up with the term “atom”.

_____

2. What is the meaning of the Greek term “atomos”?

_____

3. What is the electrical charge on electrons?

_____

4. Who came up with the “plum pudding” model of the atom?

_____

5. What is the electrical charge on the nucleus?

_____

6. What is another name for the orbits of electrons described by Bohr?

_____

7. Ernest Rutherford thought that atoms were mainly composed of what?

_____

8. Which type of particles did Rutherford fire at gold foil?

_____

9. What is the “ground state” when referring to atoms?

_____

10. Which electrons control the chemical behaviour of an atom?

_____

11. What is the maximum number or electrons in the outer shell of an atom?

_____

12. What is a “quantum”?

_____

13. What is the name of the range of colours emitted by a heated atom?

_____

Bohr's Model of the Atom

True/ False response worksheet - Circle the correct answer

1. Bohr was the first person to come up with a model for the atom.

   True / False

2. Dalton said that atoms could be broken into smaller pieces.

   True / False

3. JJ Thomson came up with the "plum pudding" model of the atom.

   True / False

4. JJ Thomson came up with a nuclear model of the atom.

   True / False

5. Bohr analysed the spectral lines of hydrogen.

   True / False

6. Bohr was born in Sweden.

   True / False

7. The atomic number of an element determines its position in the Periodic Table.

   True / False

8. The Rutherford model of the atom had electrons moving around the nucleus in fixed orbits.

   True / False

9. The element hydrogen has the simplest spectrum of any element.

   True / False

10. Electrons fill up shells of an atom in a random order.

    True / False

11. Electrons that have received energy and move into higher energy levels are "excited".

    True / False

12. The Bohr model is only accurate with the hydrogen atom.

    True / False

13. Schrödinger suggested that when electrons orbit a nucleus, they can behave like waves.

    True / False

14. The Bohr model has been used as a basis for more sophisticated models of atom

    True / False

15. Schrödinger came up with the theory of electrons being in subshells.

    True / False

Suggested Student Responses

Before Viewing the Program

Check "pre-knowledge" of students before viewing program.

1. What is meant by a "particle"?
   Small piece/bit of something.

2. What is an atom?
   Smallest part of an element

3. What is "matter"?
   Anything that has mass and takes up space.

4. Name three particles that make up atoms.
   Proton, electron and neutron.

5. Name two famous scientists who had theories about atoms.
   Dalton, Thomson, Rutherford, Bohr, Schrödinger.

After Viewing the Program

1. Give the name of the person who first came up with the term “atom”.
   Democritus

2. What is the meaning of the Greek term “atomos”?
   Indivisible

3. What is the electrical charge on electrons?
   Negative

4. Who came up with the “plum pudding” model of the atom?
   JJ Thomson

5. What is the electrical charge on the nucleus?
   Positive

6. What is another name for the orbits of electrons described by Bohr?
   Shells

7. Ernest Rutherford thought that atoms were mainly composed of what?
   Empty space

8. Which type of particles did Rutherford fire at gold foil?
   Alpha

9. What is the “ground state” when referring to atoms?
   Lowest stable energy state

10. Which electrons control the chemical behaviour of an atom?
    Outer/valence

11. What is the maximum number or electrons in the outer shell of an atom?
    2 for H, He, 8 others.

12. What is a “quantum”?
    (Smallest) unit of energy

13. What is the name of the range of colours emitted by a heated atom?
    Spectrum

Bohr's Model of the Atom

True false response worksheet

1. Bohr was the first person to come up with a model for the atom.
   False

2. Dalton said that atoms could be broken into smaller pieces.
   False

3. JJ Thomson came up with the "plum pudding" model of the atom.
   False

4. JJ Thomson came up with a nuclear model of the atom.
   False

5. Bohr analysed the spectral lines of hydrogen.
   True

6. Bohr was born in Sweden.
   False

7. The atomic number of an element determines its position in the Periodic Table.
   True

8. The Rutherford model of the atom had electrons moving around the nucleus in fixed orbits.
   False

9. The element hydrogen has the simplest spectrum of any element.
   True

10. Electrons fill up shells of an atom in a random order.
    False

11. Electrons that have received energy and move into higher energy levels are "excited".
    True

12. The Bohr model is only accurate with the hydrogen atom.
    True

13. Schrödinger suggested that when electrons orbit a nucleus, they can behave like waves.
   True

14. The Bohr model has been used a basis for more sophisticated models of atom
    True

15. Schrödinger came up with the theory of electrons being in subshells.
    True