Particle diagrams

Learning objectives

1. Recall, draw and describe the particle model for solids, liquids and gases where particles are represented by circles/spheres.
2. Use particle diagrams to represent chemical reactions and physical changes.
3. Evaluate the use of particle diagrams.

Introduction

Particle diagrams are often used to show the arrangement of atoms and molecules in substances. It is important that we understand all the information given in these diagrams and their limitations.

Instructions

1. Stick the structure strip in the margin of your exercise book/paper.
2. Follow the prompts to write a summary of particle diagrams. You can use a textbook, revision guide or website to help you. Write in full sentences, rephrasing the question within your answer and using appropriate keywords.
3. Answer the follow-up question below to apply your knowledge of particle diagrams to a new context.

Keywords

Use these key words in your responses:

• solid • liquid • gas • substance • particle • atom • molecule • mixture • regular   
• irregular • arrangement

Follow-up question

Three squares containing particle diagrams are arranged in a horizontal line.

The first square is labelled Substance X and contains three pale orange circles, touching each other in a line at the bottom of the box.

There is a plus sign between the first square and the second square.

The second square is labelled Substance Y.

The second square contains six red circles. The circles are in three pairs. The red circles within each pair are touching each other. The three pairs are distributed evenly in the box.

There is an arrow pointing from the second square towards the third square.

The third square is labelled Substance Z. The third square contains nine circles. These are arranged in three groups of three circles. Each group of three circles contains two red circles and one pale orange circle. The circles are arrange in a triangular shape so that each circle in the group of three is touching two other circles in the group of three.

Substance X

Substance Z

Substance Y

The diagram shows a chemical reaction. Explain how the diagram shows this is a chemical reaction and what the diagram shows about the types and states of the substances involved. Suggest a symbol equation with state symbols that would fit the diagram.

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| **Structure strip Particle diagrams** | **Structure strip Particle diagrams** | **Structure strip Particle diagrams** | **Structure strip Particle diagrams** | **Structure strip Particle diagrams** |
| Draw diagrams of the arrangement of particles for each of the following states:   * solid * liquid * gas   Describe and explain the key features of your diagrams. | Draw diagrams of the arrangement of particles for each of the following states:   * solid * liquid * gas   Describe and explain the key features of your diagrams. | Draw diagrams of the arrangement of particles for each of the following states:   * solid * liquid * gas   Describe and explain the key features of your diagrams. | Draw diagrams of the arrangement of particles for each of the following states:   * solid * liquid * gas   Describe and explain the key features of your diagrams. | Draw diagrams of the arrangement of particles for each of the following states:   * solid * liquid * gas   Describe and explain the key features of your diagrams. |
| Explain why representing atoms and molecules as circles/spheres is useful for representing state changes. | Explain why representing atoms and molecules as circles/spheres is useful for representing state changes. | Explain why representing atoms and molecules as circles/spheres is useful for representing state changes. | Explain why representing atoms and molecules as circles/spheres is useful for representing state changes. | Explain why representing atoms and molecules as circles/spheres is useful for representing state changes. |
| Using circles for the individual atoms, show what happens when sulfur, S, reacts with oxygen, , to make sulfur dioxide, . Explain your diagram. | Using circles for the individual atoms, show what happens when sulfur, S, reacts with oxygen, , to make sulfur dioxide, . Explain your diagram. | Using circles for the individual atoms, show what happens when sulfur, S, reacts with oxygen, , to make sulfur dioxide, . Explain your diagram. | Using circles for the individual atoms, show what happens when sulfur, S, reacts with oxygen, , to make sulfur dioxide, . Explain your diagram. | Using circles for the individual atoms, show what happens when sulfur, S, reacts with oxygen, , to make sulfur dioxide, . Explain your diagram. |
| Using circles for the individual atoms, show what happens when iron, Fe, mixes with sulfur, S, but does not react. Explain your diagram. | Using circles for the individual atoms, show what happens when iron, Fe, mixes with sulfur, S, but does not react. Explain your diagram. | Using circles for the individual atoms, show what happens when iron, Fe, mixes with sulfur, S, but does not react. Explain your diagram. | Using circles for the individual atoms, show what happens when iron, Fe, mixes with sulfur, S, but does not react. Explain your diagram. | Using circles for the individual atoms, show what happens when iron, Fe, mixes with sulfur, S, but does not react. Explain your diagram. |
| Five black circles. The black circles are spaced apart so that they are not touching. Each black circle has four smaller green circles attached to it. The green circles are evenly spaced and are not touching each other. Each green circle is only touching the black circle that it surrounds.Evaluate the pros and cons of this diagram which shows molecules of methane, , as a gas. | Five black circles. The black circles are spaced apart so that they are not touching. Each black circle has four smaller green circles attached to it. The green circles are evenly spaced and are not touching each other. Each green circle is only touching the black circle that it surrounds.Evaluate the pros and cons of this diagram which shows molecules of methane, , as a gas. | Five black circles. The black circles are spaced apart so that they are not touching. Each black circle has four smaller green circles attached to it. The green circles are evenly spaced and are not touching each other. Each green circle is only touching the black circle that it surrounds.Evaluate the pros and cons of this diagram which shows molecules of methane, , as a gas. | Five black circles. The black circles are spaced apart so that they are not touching. Each black circle has four smaller green circles attached to it. The green circles are evenly spaced and are not touching each other. Each green circle is only touching the black circle that it surrounds.Evaluate the pros and cons of this diagram which shows molecules of methane, , as a gas. | Five black circles. The black circles are spaced apart so that they are not touching. Each black circle has four smaller green circles attached to it. The green circles are evenly spaced and are not touching each other. Each green circle is only touching the black circle that it surrounds.Evaluate the pros and cons of this diagram which shows molecules of methane, , as a gas. |