ATOMIC STRUCTURE MR BREWER S CHEMISTRY CLASSES PDF

Atomic structure Mr. Brewer's chemistry classes provide students with an in-depth understanding of the fundamental building blocks of matter, laying the foundation for advanced studies in chemistry. Whether you're a high school student preparing for exams or a college student seeking clarity on atomic concepts, Mr. Brewer's engaging teaching approach simplifies complex topics and makes learning both effective and enjoyable.

Understanding Atomic Structure in Mr. Brewer's Chemistry Classes

In Mr. Brewer?s chemistry classes, the concept of atomic structure is explored comprehensively, emphasizing both theoretical principles and practical applications. The lessons are designed to help students grasp not just the definitions but also the significance of atomic structure in understanding the behavior of elements and compounds.

What Is Atomic Structure?

Atomic structure refers to the arrangement of subatomic particles within an atom?namely protons, neutrons, and electrons. These particles determine the atom's properties, including its mass, charge, and reactivity.

The Importance of Studying Atomic Structure

Understanding atomic structure is essential because:

- It explains the periodic table's organization.
- It helps predict element behavior in chemical reactions.
- It provides insight into isotopes and their applications.
- It forms the basis for understanding chemical bonding and molecular structures.

Core Concepts Covered in Mr. Brewer?s Classes

Mr. Brewer?s lessons cover core concepts systematically, ensuring students build a solid foundation.

Subatomic Particles

- Protons: Positively charged particles found in the nucleus.
- Neutrons: Neutral particles that contribute to the atom's mass.
- Electrons: Negatively charged particles orbiting the nucleus in electron clouds.

Atomic Number and Mass Number

- Atomic Number (Z): The number of protons in an atom, uniquely identifying an element.
- Mass Number (A): The total number of protons and neutrons in the nucleus.

Isotopes

- Variants of the same element with different neutron counts.
- Examples include Carbon-12 and Carbon-14.
- Applications in radiocarbon dating, medical imaging, and nuclear energy.

Electron Configuration

- Describes the distribution of electrons in an atom's orbitals.
- Follows the Aufbau principle, Hund?s rule, and Pauli exclusion principle.
- Important for understanding chemical reactivity and bonding.

Atomic Models Through History

Mr. Brewer?s classes explore the evolution of atomic models:

- Dalton?s Solid Sphere Model: Atoms as indivisible spheres.
- Thomson?s Plum Pudding Model: Electrons embedded in a positive sphere.
- Rutherford?s Nuclear Model: Dense nucleus with electrons orbiting.
- Bohr?s Model: Quantized orbits and energy levels.
- Quantum Mechanical Model: Electron clouds and probability distributions.

Visual Aids and Practical Activities

Mr. Brewer enhances learning with visual aids and hands-on activities:

- 3D models of atomic structures to visualize protons, neutrons, and electrons.

- Interactive simulations demonstrating electron orbitals and energy levels.
- Lab experiments such as spectral line analysis to observe atomic emissions.
- Periodic table exercises to understand element properties based on atomic structure.

Relevance of Atomic Structure in Modern Chemistry

Understanding atomic structure is vital in numerous fields. Mr. Brewer emphasizes real-world applications, such as:

Material Science

- Developing new materials with specific properties by manipulating atomic arrangements.

Medicine

- Use of isotopes in diagnostic imaging and cancer treatments.

Environmental Science

- Tracing pollutants and studying radioactive decay in environmental monitoring.

Energy

- Nuclear power generation relies on understanding nuclear structure and reactions.

Preparation Tips for Students

To excel in mastering atomic structure based on Mr. Brewer?s classes, students should:

- Review and memorize key definitions and concepts regularly.
- Practice drawing electron configurations for different elements.
- Use flashcards to remember atomic numbers, mass numbers, and isotope information.
- Engage actively in class discussions and ask questions about topics of interest.
- Participate in laboratory activities to reinforce theoretical knowledge with practical experience.

Additional Resources and Study Aids

Mr. Brewer?s classes often incorporate supplementary materials to enhance understanding:

- Online interactive quizzes for self-assessment.
- Video tutorials explaining complex concepts visually.
- Practice problem sets on atomic calculations and configurations.
- Access to detailed periodic table charts highlighting atomic properties.

Conclusion

In conclusion, **atomic structure Mr. Brewer's chemistry classes** serve as an essential stepping stone for anyone interested in chemistry. Through clear explanations, engaging activities, and practical applications, students gain a comprehensive understanding of the atom's inner workings. This knowledge not only prepares students for exams but also fosters an appreciation of how atomic structure influences the physical world around us. Whether you're aiming to excel in school or pursue a career in science, mastering atomic structure with Mr. Brewer?s guidance is a valuable and rewarding endeavor.

Atomic Structure Mr. Brewer?s Chemistry Classes: An In-Depth Review

Understanding the atomic structure is fundamental to mastering chemistry, and Mr. Brewer?s chemistry classes on this topic stand out as an excellent resource for students aiming to grasp both the basics and the intricate details of atomic theory. In this comprehensive review, we will explore the strengths, content quality, teaching approach, and overall effectiveness of Mr. Brewer?s classes focused on atomic structure, dissecting each aspect to determine how they contribute to student learning.

Overview of Mr. Brewer?s Approach to Teaching Atomic Structure

Mr. Brewer?s chemistry classes are renowned for their clarity, depth, and engaging delivery. When it comes to atomic structure, he combines traditional teaching methods with innovative techniques to facilitate understanding of complex concepts. His approach emphasizes not just theoretical knowledge but also practical applications and visualizations, making the abstract nature of atoms more tangible.

Key Features of his teaching style include:

- Clear, step-by-step explanations
- Use of visual aids like diagrams, models, and animations
- Interactive questioning to reinforce understanding

- Real-world examples linking atomic theory to everyday phenomena
- Structured lesson plans that build progressively from basic to advanced concepts

Curriculum Content Breakdown on Atomic Structure

Mr. Brewer?s atomic structure classes are comprehensive, covering all essential topics needed for exams and a solid understanding of chemistry. The curriculum is carefully organized into logical sections, ensuring students build their knowledge systematically.

1. Introduction to Atomic Theory

- Historical development:
- Democritus and the concept of the atom
- Dalton?s atomic theory and its postulates
- Thomson?s discovery of the electron
- Rutherford?s gold foil experiment and nuclear model
- Bohr?s planetary model
- Modern quantum mechanical model
- Significance of atomic theory in modern chemistry

2. Atomic Models and Their Evolution

- Dalton?s solid sphere model
- Thomson?s plum pudding model
- Rutherford?s nuclear model
- Bohr?s quantized energy levels
- Quantum mechanical model (Schrödinger?s wave equation)
- Comparison table highlighting differences and improvements

3. Subatomic Particles

- Protons:
- Charge, mass, and location in the nucleus
- Significance in defining atomic number
- Neutrons:
- Role in isotopes and nuclear stability
- Mass contribution
- Electrons:

- Distribution in orbitals
- Electron cloud and probability regions
- Role in chemical bonding and reactions

4. Atomic Number, Mass Number, and Isotopes

- Definitions and calculations
- How isotopes differ and their uses
- Real-world applications (radiocarbon dating, medical imaging)

5. Electron Configuration and Quantum Numbers

- Principles of electron filling:
- Aufbau principle
- Pauli exclusion principle
- Hund?s rule
- Quantum numbers:
- Principal (n)
- Azimuthal (l)
- Magnetic (m)
- Spin (s)
- Importance in determining element properties

6. Atomic Spectra and Quantum Mechanics

- Emission and absorption spectra
- Balmer series
- How spectra provide evidence for quantized energy levels
- Introduction to wave-particle duality and uncertainty principle

Teaching Methodologies and Resources

Mr. Brewer enhances his classes with a variety of teaching tools that cater to diverse learning styles:

Visual Aids and Models:

- Diagrams illustrating atomic models

- 3D physical models of atoms and subatomic particles
- Animations demonstrating electron transitions and spectra

Hands-On Activities:

- Interactive simulations allowing students to manipulate atomic models
- Practice problems on calculating atomic number, mass number, and configurations
- Quizzes and quick-fire questions to test retention

Supplemental Materials:

- Detailed handouts summarizing key concepts
- Annotated diagrams with labels and explanations
- Practice exam questions aligned with curriculum standards

Classroom Engagement:

- Socratic questioning to stimulate critical thinking
- Group discussions on atomic history and models
- Real-life applications discussions to contextualize learning

Strengths of Mr. Brewer?s Atomic Structure Classes

- Clarity and Depth

Mr. Brewer excels in breaking down complex topics into understandable segments. His explanations often start with fundamental principles before layering in more advanced details, which is especially beneficial for students new to atomic theory.

- Visual Learning Support

The use of diagrams, animations, and physical models helps students visualize structures that are inherently microscopic and abstract. This multi-sensory approach caters to visual and kinesthetic learners alike.

- Engaging Teaching Style

His energetic delivery and interactive questioning keep students attentive and actively involved. This engagement fosters better retention and encourages curiosity.

- Well-Structured Content

The logical progression from early atomic models to modern quantum theory ensures students develop a comprehensive understanding without feeling overwhelmed.

- Relevance and Application

By linking atomic concepts to real-world contexts such as medical imaging, nuclear energy, and spectroscopy, Mr. Brewer makes the subject matter relevant and interesting.

Areas for Improvement and Student Feedback

While Mr. Brewer?s classes are highly effective, some students have suggested:

- Additional focus on mathematical calculations related to atomic structure for exam practice
- More in-depth coverage of quantum mechanics concepts, which can be challenging
- Incorporation of more online resources and quizzes for self-assessment
- Extended sessions on isotope applications and nuclear chemistry topics

Overall, however, feedback remains positive, with students appreciating his clarity, approachability, and thoroughness.

Impact on Student Learning and Performance

Students who attend Mr. Brewer?s atomic structure classes often report:

- Improved understanding of atomic models and theories
- Greater confidence in answering exam questions related to atomic structure
- Increased interest in chemistry as a subject
- Better ability to connect atomic concepts to broader scientific principles

His teaching methods have also been linked to higher exam scores and deeper conceptual

comprehension, particularly when complemented with self-study and practice problems.

Conclusion: Is Mr. Brewer?s Atomic Structure Class Worth It?

In summary, Mr. Brewer?s chemistry classes on atomic structure are a highly valuable resource for students aiming to master this critical topic. His combination of clear explanations, engaging visuals, and structured curriculum provides a robust foundation for understanding atomic theory?s evolution, subatomic particles, and quantum mechanics.

For students looking to excel in chemistry, his classes offer a comprehensive, engaging, and practical approach that can significantly enhance learning outcomes. Whether you're a beginner seeking to understand the basics or an advanced student delving into quantum models, Mr. Brewer?s classes serve as an excellent platform to deepen your knowledge and develop a solid grasp of atomic structure.

In conclusion, investing time in Mr. Brewer?s atomic structure lessons can be a game-changer for your chemistry journey, making complex concepts accessible and inspiring a lasting interest in the microscopic world of atoms.

QuestionAnswer What is the basic structure of an atom as taught in Mr. Brewer's chemistry classes? In Mr. Brewer's chemistry classes, the basic structure of an atom consists of a nucleus containing protons and neutrons, with electrons orbiting this nucleus in defined energy levels or shells. How do atomic number and mass number differ according to Mr. Brewer's lessons? The atomic number is the number of protons in an atom's nucleus, determining the element, while the mass number is the total number of protons and neutrons, representing the atom's overall mass. What is the significance of electron configuration in atomic structure, as explained by Mr. Brewer? Electron configuration describes how electrons are distributed across different energy levels and orbitals, which influences an element's chemical properties and reactivity. How are isotopes explained in Mr. Brewer's atomic structure lessons? Isotopes are variants of the same element that have the same number of protons but different numbers of neutrons, resulting in different mass numbers but similar chemical behavior. What role do subatomic particles play in atomic structure according to Mr. Brewer? Protons, neutrons, and electrons are the subatomic particles that compose an atom; protons and neutrons form the nucleus, while electrons occupy energy levels around it, determining the atom's properties. How does Mr. Brewer explain the concept of atomic orbitals and their shapes? Mr. Brewer describes atomic orbitals as regions around the nucleus where electrons are most likely to be found, with shapes such as s, p, d, and f, which help explain the arrangement of electrons in atoms. Why is understanding atomic structure important in chemistry, as emphasized in Mr. Brewer's classes? Understanding atomic structure is fundamental because it explains how elements behave, interact, and form compounds, which is essential for mastering chemical reactions and properties.

Related keywords: atomic structure, mr brewer, chemistry classes, atomic models, electrons, protons, neutrons, atomic theory, periodic table, atomic number

Atomic Mass And Atomic Number Answer Key

Understanding Atomic Mass and Atomic Number Answer Key

Atomic mass and atomic number answer key are fundamental concepts in chemistry that help students and enthusiasts understand the properties of elements. These key concepts serve as the foundation for comprehending how atoms are structured and how they behave in chemical reactions. Whether you're preparing for exams, working on homework, or simply eager to deepen your understanding of atomic theory, grasping the atomic mass and atomic number is essential.

In this comprehensive guide, we will explore the definitions of atomic mass and atomic number, their significance, how to interpret and use answer keys for learning, and practical examples to solidify your understanding.

What Is Atomic Number?

Definition of Atomic Number

The atomic number (represented as Z) of an element is the number of protons contained within the nucleus of an atom of that element. It is a unique identifier for each element and determines its position on the periodic table.

Significance of Atomic Number

- Defines the element: Each element has a specific atomic number. For example, hydrogen has Z = 1, helium Z = 2.
- Determines chemical properties: The number of protons influences the element's chemical behavior.
- Influences electrons: In a neutral atom, the atomic number equals the number of electrons.

Examples of Atomic Numbers

| Element | Atomic Number (Z) |

|---------|-------------------|

| Hydrogen | 1 |

| Carbon | 6 |

| Oxygen | 8 |

| Iron | 26 |

| Gold | 79 |

What Is Atomic Mass?

Definition of Atomic Mass

Atomic mass (also called atomic weight) is the weighted average mass of the atoms in a naturally occurring sample of an element, measured in atomic mass units (amu). It accounts for the relative abundance of isotopes of each element.

Understanding Atomic Mass and Isotopes

- Isotopes are atoms of the same element with different numbers of neutrons, hence different atomic masses.
- Atomic mass reflects the average of all isotopic masses based on their natural abundance.

Atomic Mass vs. Atomic Weight

While often used interchangeably, atomic weight refers specifically to the average atomic mass of an element's isotopes as listed on the periodic table.

Using the Atomic Mass and Atomic Number Answer Key

Purpose of an Answer Key

An answer key provides the correct responses to exercises, problems, or questions related to atomic mass and atomic number. It helps students verify their understanding and identify areas needing improvement.

How to Use the Answer Key Effectively

- Cross-reference your answers with the key to check accuracy.
- Study explanations provided for each answer to reinforce concepts.
- Use the answer key as a learning tool, not just a means to get correct answers.
- Practice with different questions to deepen understanding.

Common Types of Questions in Atomic Mass and Atomic Number Exercises

- Identify the atomic number of a given element.
- Calculate the number of protons, neutrons, or electrons in an atom.
- Determine the atomic mass given isotope data.
- Find the average atomic mass based on isotope abundances.
- Match elements to their atomic numbers or atomic masses.

Practical Examples and Sample Questions

Example 1: Identifying Atomic Number

Question: What is the atomic number of oxygen?

Answer: 8

Explanation: Oxygen has 8 protons in its nucleus, so its atomic number is 8.

Example 2: Calculating Neutrons

Question: An isotope of carbon has an atomic mass of 14 amu. How many neutrons does this isotope have?

Answer: 8 neutrons

Calculation:

- Atomic number of carbon (Z) = 6
- Atomic mass of isotope = 14 amu
- Neutrons = Atomic mass - Atomic number = 14 - 6 = 8

Example 3: Using Atomic Mass to Determine Isotope Composition

Question: If an element has two isotopes, one with 75% abundance and an atomic mass of 20 amu,

and the other with 25% abundance and an atomic mass of 22 amu, what is the average atomic mass?

Answer: 20.5 amu

Calculation:

- (0.75 × 20) + (0.25 × 22) = 15 + 5.5 = 20.5 amu

Example 4: Matching Elements with Atomic Numbers

Question: Match the following elements with their atomic numbers:

- Hydrogen
- Silicon
- Uranium

Answer:

- Hydrogen ? 1
- Silicon ? 14
- Uranium ? 92

Tips for Mastering Atomic Mass and Atomic Number Questions

- Memorize the atomic numbers of common elements for quick recall.
- Understand how to interpret isotope data and calculate atomic mass.
- Practice converting between protons, neutrons, and electrons.
- Use periodic tables as reference tools for atomic masses and numbers.
- Review answer keys to identify common mistakes and misconceptions.

Conclusion

Understanding the concepts of atomic mass and atomic number is crucial for mastering foundational chemistry topics. The atomic mass and atomic number answer key serves as an invaluable resource for students, educators, and self-learners aiming to verify their knowledge and improve their grasp of atomic structure. By regularly practicing with questions and consulting answer keys, learners can

build confidence and competence in handling atomic data, ultimately enhancing their overall chemistry skills.

Remember, the periodic table is your best friend in these exercises, providing quick access to atomic numbers and atomic masses. With consistent practice and a solid understanding of these concepts, you'll be well-equipped to tackle advanced topics in chemistry and apply this knowledge confidently in laboratory and real-world scenarios.

Atomic Mass and Atomic Number Answer Key: An In-Depth Exploration

Understanding the fundamentals of atomic structure is essential for students, educators, and professionals involved in chemistry and related sciences. Two critical concepts at the heart of atomic theory are the atomic mass and atomic number. These properties serve as foundational identifiers of elements and underpin the organization of the periodic table. This article aims to provide an exhaustive review of atomic mass and atomic number answer key, delving into their definitions, significance, differences, and common misconceptions, while offering clarity for educators and learners alike.

Introduction to Atomic Structure: The Building Blocks of Matter

Atoms are the basic units of matter, composed of subatomic particles: protons, neutrons, and electrons. Protons and neutrons reside in the nucleus, while electrons orbit around it. The arrangement and properties of these particles define an element and influence its chemical behavior.

Two central concepts emerge when discussing atomic identity:

- Atomic Number (Z): The number of protons in an atom's nucleus.
- Atomic Mass (Atomic Mass Number, A): The total number of protons plus neutrons in the nucleus.

Understanding these two quantities provides insight into the identity and isotopic composition of an element.

The Atomic Number: Defining Element Identity

What is the Atomic Number?

The atomic number is a unique identifier for each element, representing the number of protons in the nucleus of an atom of that element. It determines the element's position on the periodic table

and its chemical properties.

Key points about atomic number:

- It is denoted by the symbol Z.
- It is a whole number (integer).
- It is invariant for all atoms of a given element.
- It defines the element; no two different elements share the same atomic number.

Significance in Chemistry and Physics

The atomic number influences atomic behavior in several ways:

- Electronic Configuration: The number of electrons in a neutral atom equals Z, which determines how atoms bond and interact.
- Periodic Trends: Elements are ordered by increasing atomic number, revealing periodic patterns in properties.
- Nuclear Stability: Atomic number informs about the proton-to-neutron ratio, affecting isotopic stability.

Examples of Atomic Numbers

Element	Symbol	Atomic Number (Z)
Hydrogen	H	1
Carbon	C	6
Oxygen	O	8
Iron	Fe	26
Uranium	U	92

The Atomic Mass: The Mass Perspective of Atoms

What is Atomic Mass?

Atomic mass, often expressed in atomic mass units (amu), reflects the weighted average mass of all isotopes of an element as they naturally occur. It accounts for the mass contributions of protons and neutrons, but not electrons, which have negligible mass.

Key points about atomic mass:

- It is a decimal value, often close to whole numbers but not exact.
- It represents the average considering isotope abundance.
- It is listed on the periodic table beneath the element symbol.

Atomic Mass versus Atomic Mass Number

While similar terminology exists, atomic mass and atomic mass number are distinct:

| Term | Definition | Units | Notes |

|--------|--------------|--------|--------|

| Atomic Mass (Atomic Weight) | The average mass of all isotopes, weighted by abundance | amu | Usually a decimal, found on periodic table |

| Atomic Mass Number (A) | Total number of protons + neutrons in a specific isotope | Whole number | Specific to one isotope |

Calculating Atomic Mass

Atomic mass is calculated as:

$$\text{Atomic Mass} = \sum (\text{isotope mass} \times \text{relative abundance})$$

For example, Chlorine has two main isotopes:

- Cl-35 (mass ? 34.97 amu, abundance ? 75.78%)
- Cl-37 (mass ? 36.97 amu, abundance ? 24.22%)

Thus, the atomic mass of Chlorine:

$$(34.97 \times 0.7578) + (36.97 \times 0.2422) \approx 35.45 \text{ amu}$$

This value is what appears on the periodic table.

Answer Key: Clarifying Common Questions and Misconceptions

In educational settings, students often encounter questions related to atomic number and atomic mass. An answer key serves as a guide to facilitate understanding and ensure accurate responses. Here, we examine typical questions and provide detailed explanations.

Sample Questions and Explanations

- What is the atomic number of an element?

Answer: The atomic number is the number of protons in the nucleus of an atom of that element.

- How does the atomic mass differ from the atomic number?

Answer: The atomic mass accounts for the weighted average of all isotopes' masses, while the atomic number is the count of protons, which remains constant for a given element.

- Why do isotopes of an element have different atomic masses?

Answer: Because isotopes have different numbers of neutrons, their atomic masses differ even though they have the same atomic number.

- If an atom has 11 protons and 12 neutrons, what are its atomic number and atomic mass?

Answer: Atomic number = 11 (number of protons), atomic mass number = 11 + 12 = 23.

- Given a list of isotopes, how do you determine the average atomic mass?

Answer: Multiply each isotope's mass by its relative abundance, then sum these products.

Common Misconceptions Addressed in the Answer Key

- Confusing atomic mass with atomic mass number: The atomic mass is a weighted average, not

a whole number, whereas the atomic mass number is specific to an isotope.

- Believing atomic number can change: It remains constant for a given element unless the atom is transmuted.
- Assuming atomic mass is always a whole number: Due to isotopic distribution, atomic mass is typically a decimal value.

The Role of Atomic Number and Atomic Mass in the Periodic Table

The periodic table is organized primarily by increasing atomic number. Elements with similar properties are grouped into columns called groups or families. Atomic mass, while not used to organize the periodic table, provides insight into isotopic composition and atomic weight calculations.

Relation to Isotopes and Atomic Weight

Atomic weight (atomic mass) reflects the natural isotopic distribution. For elements with multiple stable isotopes, the atomic weight is an average, often a non-integer. This value is crucial for calculations in chemistry and physics, including molar conversions and stoichiometry.

Implications for Scientific Research and Education

Understanding atomic mass and atomic number answer key is vital for:

- Accurate identification of elements.
- Proper interpretation of periodic table data.
- Correct calculation of molar masses.
- Comprehension of isotopic variations and their impact on atomic properties.

For educators, providing clear answer keys enhances student learning, helps in exam preparation, and clarifies misconceptions.

Conclusion

The concepts of atomic mass and atomic number are fundamental to comprehending atomic structure and elemental properties. While the atomic number uniquely identifies an element, the atomic mass provides a weighted average reflecting isotopic composition. An answer key serves as an essential resource to reinforce understanding, clarify common questions, and address misconceptions.

In advancing scientific literacy, mastery of these concepts enables better interpretation of the

periodic table, more accurate chemical calculations, and a deeper appreciation of the atomic nature of matter. As science progresses, these foundational properties continue to underpin innovations in nuclear physics, chemistry, and materials science.

Remember: Precise knowledge of atomic mass and atomic number is not only academic but also practical, influencing fields from medicine to engineering. Mastery of these topics ensures a solid base for future scientific endeavors.

QuestionAnswer What is the difference between atomic mass and atomic number? Atomic number is the number of protons in an atom's nucleus, which defines the element, while atomic mass is the total mass of protons and neutrons in the atom's nucleus, usually expressed in atomic mass units (amu). How is the atomic number used to identify an element? The atomic number uniquely identifies an element because each element has a specific number of protons; for example, carbon has an atomic number of 6. Why is the atomic mass often a decimal value in atomic mass tables? Atomic mass is often a decimal because it is an average of the masses of all isotopes of an element, weighted by their natural abundance. Can an element have the same atomic number but different atomic masses? Yes, elements with the same atomic number but different atomic masses are isotopes, which differ in the number of neutrons. How do you calculate the atomic mass of an element from its isotopic abundances? You multiply each isotope's atomic mass by its relative abundance (as a decimal) and then sum these values to get the weighted average atomic mass. What information is provided by the atomic number and atomic mass in the periodic table? The atomic number indicates the element's identity and position in the periodic table, while the atomic mass provides information about the average mass of its isotopes, useful for calculations involving moles and atomic particles.

Related keywords: atomic mass, atomic number, periodic table, isotopes, element symbol, protons, neutrons, electrons, atomic weight, nucleus

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