

7&8 • Atomic Structure & Periodicity

PRACTICE TEST

$$Rhc = A$$

$$A = 2.18 \times 10^{-18} \text{ J}$$

$$h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$R = 1.097 \times 10^7 \text{ m}^{-1}$$

$$c = 3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}$$

$$\text{mass of an electron} = 9.11 \times 10^{-31} \text{ kg}$$

1. What wavelength corresponds to a frequency of $8.22 \times 10^9 \text{ Hz}$?

$$\lambda = \frac{c}{\nu}$$

- a) 0.307 m d) 0.110 m

- b) 0.0365 m c) 27.4 m

- c) 0.122 m $\frac{3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}}{8.22 \times 10^9 \text{ s}^{-1}} = .036496 \text{ m}$

2. A radio station transmits at 110 MHz ($110 \times 10^6 \text{ Hz}$). What wavelength is this radio wave?

- a) $3.65 \times 10^{-5} \text{ m}$ c) $3.81 \times 10^{-5} \text{ m}$

- b) 3.30 m d) 2.73 m

$$\lambda = \frac{c}{\nu} = \frac{3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}}{110 \times 10^6 \text{ s}^{-1}} = 2.73 \text{ m}$$

3. Which one of the following is NOT a proper unit for frequency?

- a) Hz

- b) s^{-1}

- c) $\text{m}\cdot\text{s}^{-1}$ velocity

- d) $\frac{1}{\text{sec}}$

4. Calculate the wavelength of the fourth line in the Balmer series (the visible series) of the hydrogen spectrum.

$$n=6 \rightarrow n=2$$

$$E_6 = -2.18 \times 10^{-18} \text{ J} - E_2 = -2.18 \times 10^{-18} \text{ J}$$

- a) 0.12334 m d) $4.1029 \times 10^{-7} \text{ m}$

- b) 24.373 m e) 36.559 m

$$E = \frac{hc}{\lambda} \quad \lambda = \frac{hc}{E} = 4.1 \times 10^{-7} \text{ m}$$

$$\Delta E = 4.84 \times 10^{-19} \text{ J}$$

5. What is the relationship between the energy of a photon of light and its frequency?

- a) $E = \nu$

- d) $E = \frac{1}{h\nu}$

- b) $E = \frac{h}{\nu}$

- e) $E = \frac{\nu}{h}$

- c) $E = h\nu$

6. What is the energy needed to raise an electron in the hydrogen atom from the second energy level to the third energy level?

$$\Delta E = E_3 - E_2$$

- a) $1.52 \times 10^{-4} \text{ J}$ d) $4.48 \times 10^{-19} \text{ J}$

- b) $3.63 \times 10^{-19} \text{ J}$ e) $3.03 \times 10^{-19} \text{ J}$

$$c) 2.18 \times 10^{-19} \text{ J} - \frac{-2.18 \times 10^{-18} \text{ J}}{9} - \frac{-2.18 \times 10^{-18} \text{ J}}{4}$$

7. What is the de Broglie wavelength of an electron moving at 80.0% the speed of light.

- a) $3.03 \times 10^{-12} \text{ m}$ c) $3.30 \times 10^{11} \text{ m}$

- b) $2.42 \times 10^{-12} \text{ m}$ d) $1.59 \times 10^{-25} \text{ m}$

$$\lambda = \frac{h}{m\nu} = \frac{6.626 \times 10^{-34} \text{ J}\cdot\text{s}}{9.11 \times 10^{-31} \text{ kg} \times .8 \times 3.00 \times 10^8 \text{ m}\cdot\text{s}^{-1}}$$

8. What resultant is expected from the interference of the two waves shown below?



- a) c) d)

- b) d)

9. Which quantum number determines the subshell occupied by an electron (s, p, d, f, etc.)?

- a) n

- c) m_l

- b) ℓ

- d) m_s

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JE Gale



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periodic table and how it organizes elements based on their atomic structure We will explore periodic trends such as atomic radius ionization energy and electron affinity and discuss how these trends are related to an element's position on the table In our final chapter we will discuss the significance of atomic structure in various chemical reactions including bonding stoichiometry and the behavior of gases We will also explore the importance of understanding atomic structure in fields such as biochemistry environmental science and materials science Throughout this book we will provide clear explanations helpful illustrations and interactive activities to reinforce key concepts Whether you are a visual learner a hands on learner or a theoretical learner this book is designed to meet your needs We hope that this book will not only enhance your understanding of atomic structure but also inspire you to further explore the wonders of chemistry So let's dive in and unlock the mysteries of the atom together

Chemistry and Atomic Structure Jd Main Smith,2023-07-18 This book is an introduction to the chemistry of atomic structure It covers the basic principles of atomic theory including the nature of atoms chemical bonds and chemical reactions The author provides clear explanations of complex concepts making this book accessible to students and non experts alike Anyone interested in chemistry or atomic theory will find this book a useful resource This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it This work is in the public domain in the United States of America and possibly other nations Within the United States you may freely copy and distribute this work as no entity individual or corporate has a copyright on the body of the work Scholars believe and we concur that this work is important enough to be preserved reproduced and made generally available to the public We appreciate your support of the preservation process and thank you for being an important part of keeping this knowledge alive and relevant

Atomic and Molecular Structure Joel Chaffee,2011-01-15 Learn about the atom what it is the people responsible for helping us understand it and how it affects us in the world today [Atomic Theory and Structure of the Atom](#) T. A. H. Peacocke,2013-10-22 Atomic and Nuclear Chemistry Volume 1 Atomic Theory and Structure of the Atom presents the modern ideas of the atomic theory and atomic structure against the background of their historical development Topics covered include the classification of elements atoms and electrons the wave mechanical model of the atom and the determination of atomic weights This volume is comprised of six chapters and begins by discussing the origin of the atomic theory focusing on the role of John Dalton Avogadro's hypothesis and the introduction to the laws of chemical combination The chapters that follow look at the work of the early scientists that led to the development of the periodic table of elements the use of the Avogadro number to determine the actual masses of atoms and molecules and the structure of the atom The essential results of the simple wave mechanical treatment are summarized in the next chapter This book concludes by considering developments in the determination of atomic weights Some brief notes on the character and personality of the great scientists who are mentioned throughout the text are included This book is intended for students and practitioners in the fields of chemistry and physics

Atomic Structure and Chemical Reactions Nevin Katz,2007-05 Featuring the

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Chandan Sengupta, First Publication April 2019 Revised Publication October 2022 Second Revised Edition July 2023 Third
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