

What are the properties of light?

Background

Light is both a wave and a particle. The wave properties of light include frequency and wavelength. On an atomic level light also shows particle-like properties. A photon is a 'particle' of light. Within the visible spectrum, we see different wavelengths of light as different colors. The primary colors are red, green, and blue. Other colors can be made by mixing red, green, and blue. Blue light is more energetic than red light. The investigation will use photo luminescence to demonstrate the different energy content of red and blue light. A diffraction grating splits light up into its spectrum.

Almost all the light you see is produced by atoms. When atoms absorb energy, electrons rise to higher energy levels. When the electrons fall back to their lower energy state, they may release energy in the form of light. In some elements it takes time for the energized electrons to fall back and give up their energy. These elements store energy and give off light slowly over a period of time. This is how glow-in-the-dark material works. Embedded in the material are atoms of the element phosphorus. When light energy hits the phosphorus atoms, some of the electrons absorb energy. When the electrons fall back, they release the stored energy and the material glows. The glow stops when all the electrons have returned to the lowest energy level. The process is called **photoluminescence**. The word "photo" means light and the word "luminescence" means glowing.

The quantum theory of light

- A photon is a small quantity (like a particle) of light. You can think of a photon like a short packet of a wave. The intensity of light describes how many photons per second are produced (or absorbed). The color of each photon depends on its energy. Different colors of light are produced by photons with different energies. High energy photons have shorter wavelengths than low energy photons.
- In order to glow, an electron in a phosphorus atom must first absorb energy from a photon of light. One of the predictions of the quantum theory is that electrons cannot have any energy, but can have only the specific energies corresponding to the energy levels in a particular atom. That means a photon must have enough energy to boost the electron up one whole level to be absorbed. If the photon does not have enough energy, the electron cannot absorb it and the phosphorus atom cannot glow.

Virtual vs Real Images Can you tell what type of image a lens will make? Virtual and real images are two kinds of images that are apparent reproduction of real objects formed by a mirror or a lens. These images are formed through processes of reflection, refraction or diffracted rays of light. In a real image, light rays are brought to a focus at the position of the image. The most important aspect of image is that a real image can be made visible on a screen such as a sheet of paper whereas a virtual image cannot be produced on a screen. Virtual images are made by rays that do not actually come from where one sees the image.

In brief:

- While real image appears inverted, virtual image appears erect
- While real image can be obtained on a screen, virtual image cannot be seen on a screen.
- In case of mirrors, real image lies in front while virtual image lies behind the mirror.
- In case of lenses, real image lies on the other side of the object whereas virtual image lies on the same side of the object.

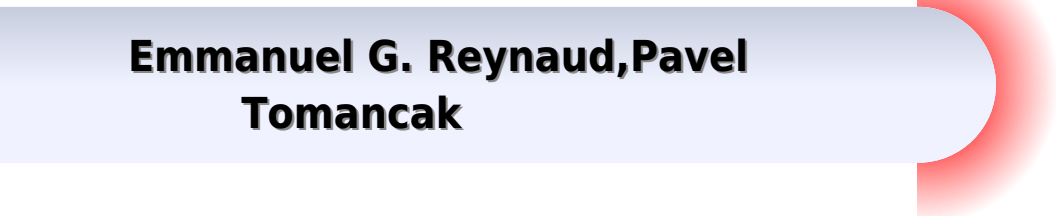
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Leading Questions

- What creates light? _____
- How does glow in the dark material work? _____
- What creates the different colors of light? _____
- How do we make different colors of light? _____
- How can we tell what colors of light we are seeing? _____

Light Lab Answer Sheet

**Emmanuel G. Reynaud, Pavel
Tomancak**



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Science Lab Manual Class IX | As per the latest CBSE syllabus and other State Board following the curriculum of CBSE. Mr. Gopi Chandra Gupta,Mr. Shivam Tiwari,2022-08-01 With the NEP and expansion of research and knowledge has changed the face of education to a great extent In the Modern times education is not just constricted to the lecture method but also includes a practical knowledge of certain subjects This way of education helps a student to grasp the basic concepts and principles Thus trying to break the stereotype that subjects like Mathematics and Science means studying lengthy formulas complex structures and handling complicated instruments we are trying to make education easy fun and enjoyable

Hands-On Physical Science Laurie E. Westphal,2021-09-09 Hands On Physical Science immerses students in the world of real life chemists and physicists Through engaging authentic learning experiences students will engage in fascinating experiments while building STEM skills This book is packed with activities that can easily be conducted in the classroom

using everyday materials and includes everything teachers need to help students think critically and problem solve as they explore the fascinating world of physical science From examining Newton s laws using sports video clips to studying energy through the design and building of roller coasters students will not just learn about physical science they will be scientists Grades 6-8 Geology From Experience E. Kirsten Peters, Larry E. Davis, 2000-11-05 Moving away from the observation and vocabulary focus of traditional physical geology lab manuals Peters and Davis s *Geology from Experience* offers experiments that favor hands on involvement and scientific problem solving Students are asked to use geological tools and techniques analyze data from observation experiment and research solve simple equations and make assessments and relevant predictions This approach class tested with great success by the authors gives students a real taste of the scientific experience by revealing the ways geologists actually do their work *Exploring Physical Science in the Laboratory* John T. Salinas, 2019-02-01 This full color manual is designed to satisfy the content needs of either a one or two semester introduction to physical science course populated by nonmajors It provides students with the opportunity to explore and make sense of the world around them to develop their skills and knowledge and to learn to think like scientists The material is written in an accessible way providing clearly written procedures a wide variety of exercises from which instructors can choose and real world examples that keep the content engaging *Exploring Physical Science in the Laboratory* guides students through the mysteries of the observable world and helps them develop a clear understanding of challenging concepts

Ocean Light Nalini Singh, 2018-12-31 New York Times bestselling author Nalini Singh dives beneath the surface of her Psy Changeling world into a story of passionate devotion and selfless love Security specialist Bowen Knight has come back from the dead But there s a ticking time bomb in his head a chip implanted to block telepathic interference that could fail at any moment taking his brain along with it With no time to waste he should be back on land helping the Human Alliance Instead he s at the bottom of the ocean consumed with an enigmatic changeling Kaia Luna may have traded in science for being a chef but she won t hide the facts of Bo s condition from him or herself She s suffered too much loss in her life to fall prey to the dangerous charm of a human who is a dead man walking And she carries a devastating secret Bo could never imagine But when Kaia is taken by those who mean her deadly harm all bets are off Bo will do anything to get her back even if it means striking a devil s bargain and giving up his mind to the enemy **Light Metals 2012** Carlos Suarez, 2016-12-23

An update of the definitive annual reference source in the field of aluminum production and related light metals technologies a great mix of materials science and practical applied technology surrounding aluminum bauxite aluminum reduction rolling casting and production *Microbiology: Laboratory Theory and Application, Brief* Michael J. Leboffe, Burton E. Pierce, 2016-01-01 This brief version of the best selling laboratory manual *Microbiology Laboratory Theory and Application* is intended for majors or non majors in introductory microbiology laboratory courses This full color manual is appropriate for courses populated primarily by allied health students and courses with a preference for an abbreviated number of

experiments

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