AnswerVerifiedHint:Absorption spectrum deals with wavelengths of light absorbed by each pigment whereas the action spectrum indicates the overall rate of photosynthesis at each wavelength of light.Complete Answer:In this question, we will be dealing with the key differences between the absorption spectrum and the action spectrum. Using a table lets list the key differences between them, Absorption spectrum Action spectrumIt shows the wavelengths of light absorbed by each pigment for, e.g., chlorophyllIt shows the overall rate of photosynthesis at each wavelength of light.It is the graphical representation of the different wavelengths of light absorbed by the different pigments in the leaf during the process of photosynthesis. It is the graphical representation of the effectiveness of the different wavelengths of light in photosynthesis.It infers the relationship between the quality of light and the absorbing capacity of pigments.It infers the relationship between photosynthetic activity in relation to different wavelengths of light.It can be studied directly.It is studied in relation to oxygen evolved or carbon dioxide absorbed.The absorption of wavelengths of different pigments can be measured with a spectrophotometer.The amount of photosynthesis can be measured with the amount of carbon dioxide fixation, oxygen production, NADP Reduction, etc.Note: It is to be noted that maximum absorption takes place in the blue region but maximum photosynthesis takes place in the red region. You know why there is so much confusion? Because they're very similar. When it comes to plant growth and development, the action spectrum for photosynthesis and the absorption spectra for chlorophyll and other molecules used in photosynthesis are nearly identical. Are there any differences then? Yes, of course. If they were the same, there would be no need for two different concepts. Differences exist, but let's be honest. The differences are not really important for most of us. Unless you're an actual scientist, it is not something you need to worry about. If you're just looking to get the most out of your plant lighting, the important takeaway is this: Plants need mostly red and blue light, but they also need some light in every other color. Choose your grow lights accordingly. I help you with this at the bottom of this article. First, let's look at action and absorption spectra and figure out exactly how they differ. What Is An Action Spectrum? The action spectrum refers to the wavelengths of electromagnetic radiation (i.e. light) that are most effective for photosynthesis. In other words, it describes the colors of light that are doing the actual work, meaning they are driving photosynthesis. In a 1972 paper, KJ McCree found that the action spectra for 22 different plant species were very similar. All showed that photosynthetic active radiation (PAR) was between 400 nm and 700 nm and that all wavelengths within this region were used in photosynthesis. The wavelengths that drove photosynthesis the most were in the red (600 nm to 700 nm) and blue (400 to 500 nm) regions. The following graph, a variation of which you have probably seen before, shows these peaks in the red and blue areas of the color spectrum. By Daniele Pugliesi (derived by M0tty from original), CC BY-SA 3.0, Link Contrary to what we are often told (usually be manufacturers of LED grow lights with only red and blue diodes), green light (500 nm to 600 nm) is also used in photosynthesis. The graph above shows some absorbance, but it only takes chlorophyll into account. Plants also have other photoreceptors that make more use of green light. It still does not contribute nearly as much as red and blue light, but it is important for plant growth and development and should be included in any grow light. What Is An Absorption Spectrum? An absorption spectrum is made up of the wavelengths of electromagnetic radiation (i.e.) light that are absorbed by a material they pass through. For our purposes, that material is plant matter and the absorption spectra show how much each color of light is absorbed by various molecules in the plant. The most commonly depicted molecules are chlorophyll A, chlorophyll B and carotenoids. The absorption spectra of chlorophyll A and B extracts show high absorption in the red and blue areas. The absorption of green wavelengths is poor, which is why plants appear green to our eyes. When they are hit with the full spectrum of light (i.e. sunlight), the green light is not absorbed, but reflected back to our eyes. Again, this is why so many LED grow lights contain only red and blue diodes. But it does not tell the whole story. There are other molecules besides chlorophyll to consider. Graph courtesy of ledgrowlightshq.co.uk. As you can see, there is definite absorption in the green and yellow wavelengths with molecules other than chlorophyll. This allows the plant to take advantage of all the non-red and non-blue light it receives and clearly indicates that you want to supply plants with at least some green light, to take advantage of their full photosynthetic capabilities. Difference Between Action Spectrum And Absorption Spectrum What is important to remember is that light absorption and light use are two different things. The action spectrum for photosynthesis shows which wavelengths are used by plants to create energy, while the absorption spectrum shows which wavelengths are most absorbed by a specific molecule. The absorption spectra for the chlorophyll A and B are very similar to the action spectrum for photosynthesis, because these two particles are the main drivers of the photosynthetic process. But other molecules play a part as well, which is why there is some difference in the absorption and action spectra. The key takeaway is this: plants use red and blue light more than any other for photosynthesis, but they also use every other wavelength to some degree. The ideal grow light will reflect this. It should provide a large amount of red and blue light, but should also contain light in every other color. Best Grow Lights To Target The Action Spectrum The ideal grow lights to take advantage of the information provided by the action spectrum for photosynthesis are LED grow lights. LED Grow Lights LED grow lights contain many LED diodes, which give off one specific color each. This allows manufacturers to tailor the spectrum of their lights however they want. Good ones provide the exact mix of light that the action spectrum describes, and in the exact ratios (learn more about how LED lights work). This means the lights emit mostly red and blue light, but also have some light in every other wavelength (generally in the form of white diodes), while also including infrared and ultra-violet wavelengths. Since they have the colors in the exact ratio that plants prefer, no light goes to waste. This is what makes LEDs the most efficient plant lights on the market. High quality lights, like the best LED grow lights listed here, provide the exact spectrum plants need. A few of the budget manufacturers give you this spectrum as well. Spider Farmer (see review here) is easily the best among them, since they combine CREE COBs with supplemental diodes, just like the much more expensive Optic LED lights, but do it at half the price. CMH Grow Lights Ceramic metal halide bulbs are the only other form of lighting that provide plants with all the light they need. The CMH spectrum is not quite as efficient as that of a good LED, because it contains more green and yellow light than plants need. Some of that light goes unused, so you are paying for some light that is being wasted. That said, CMH bulbs give you a lot of red and blue light, and they have a high output. This makes them great for growing plants, if not quite as good as LED lights. See which CMH lights are best here. Fluorescent Grow Lights Fluorescent grow lights also give you red and blue light (how much depends on the color temperature) with a lot of green and yellow. Like CMH bulbs, they emit more green and yellow than plants need. The other big drawback is power. Fluorescent bulbs give you a great spectrum, but they do not have enough power to flower a garden of any considerable size. Learn what types of fluorescent bulbs are best here. HPS Grow Lights High Pressure Sodium grow lights have been used successfully for many years. But they are far from ideal. While they have a lot of red light, they emit very little blue light. They also have a ton of yellow and some green light. Much of this is wasted energy. HPS lights are very powerful and do a great job because of it. But they use a lot of power and generate a lot of heat and much of that is wasted on light that plants don't actually use. Plus, the abundance of red light makes them great for flowering, but the absence of blue light makes them much less useful during the vegetative stage. That's where metal halide bulbs come in. MH Grow Lights Metal halide bulbs have long served as the companion to HPS. They provide a lot of blue light, but very little red. As such, they are great when used in conjunction with HPS bulbs. Unfortunately, installing both types of lights is too expensive for most growers. The compromise has been to use MH bulbs during vegging and HPS bulbs during flowering. But this is also far from ideal. It is much more efficient to use a CMH bulb (see above) during the whole grow cycle. Even better is to use an LED grow light that has a spectrum perfectly tailored for plants. If you do want to go with HPS and/or MH, this post will help you find the best light for you. Absorption Spectrum Vs Action Spectrum: Final Thoughts Hopefully you now have a better understanding of the difference between the absorption spectrum and the action spectrum. You should also have a good idea which type of grow light to use to target the action spectrum most effectively. Hint: these days, nothing beats LED grow lights anymore. The absorption spectrum and action spectrum are both important concepts in the field of spectroscopy. The absorption spectrum refers to the range of wavelengths of light that a substance can absorb. It is obtained by measuring the amount of light absorbed by a substance at different wavelengths. On the other hand, the action spectrum represents the effectiveness of different wavelengths of light in driving a specific biological process, such as photosynthesis or vision. It is obtained by measuring the rate or extent of the biological process under different wavelengths of light. While the absorption spectrum provides information about the wavelengths of light that a substance can absorb, the action spectrum provides insights into the wavelengths that are most effective in driving a specific biological process. When studying the behavior of light and its interaction with matter, two important concepts come into play: absorption spectrum and action spectrum. Both of these spectra provide valuable insights into the absorption and utilization of light by different substances. In this article, we will explore the attributes of absorption spectrum and action spectrum, highlighting their similarities and differences.Absorption SpectrumThe absorption spectrum refers to the range of wavelengths of electromagnetic radiation that a particular substance can absorb. It is obtained by passing white light through the substance and measuring the intensity of light transmitted at different wavelengths. The resulting graph, known as the absorption spectrum, shows the wavelengths at which the substance absorbs light most strongly.One of the key attributes of the absorption spectrum is that it is unique to each substance. Different substances have different molecular structures, and therefore, they absorb light at different wavelengths. This property allows scientists to identify and characterize substances based on their absorption spectra. By comparing the absorption spectrum of an unknown substance to a database of known spectra, researchers can determine its composition.Another important attribute of the absorption spectrum is that it provides information about the energy levels of the substance's electrons. When light interacts with matter, it can excite electrons to higher energy levels. The absorption spectrum reveals the specific energy transitions that occur within the substance, as each transition corresponds to a specific wavelength of absorbed light. By analyzing these transitions, scientists can gain insights into the electronic structure and properties of the substance.The absorption spectrum is typically represented as a graph with wavelength on the x-axis and absorbance or transmittance on the y-axis. The graph shows peaks and valleys, where the peaks indicate the wavelengths at which the substance absorbs light most strongly. The height of the peaks corresponds to the intensity of absorption at each wavelength.It is important to note that the absorption spectrum only provides information about the wavelengths of light that are absorbed by a substance. It does not reveal what happens to the absorbed energy or how it is utilized by the substance. This is where the action spectrum comes into play.Action SpectrumThe action spectrum, also known as the effectiveness spectrum, describes the relative effectiveness of different wavelengths of light in driving a specific biological or chemical process. It represents the response or action of a biological system to different wavelengths of light. The action spectrum is obtained by measuring the rate or extent of a particular process under different wavelengths of light.Unlike the absorption spectrum, which is unique to each substance, the action spectrum can vary depending on the biological system or process being studied. Different organisms or cellular processes may have different sensitivities to different wavelengths of light. For example, the action spectrum for photosynthesis in plants shows that chlorophyll absorbs light most efficiently in the red and blue regions of the spectrum, while green light is less effective.The action spectrum provides valuable information about the wavelengths of light that are most important for a specific biological process. By understanding the action spectrum of a process, scientists can optimize conditions for maximum efficiency. For example, in horticulture, knowledge of the action spectrum for plant growth can be used to design artificial lighting systems that provide the most suitable wavelengths for promoting plant growth.Similar to the absorption spectrum, the action spectrum is typically represented as a graph with wavelength on the x-axis. However, the y-axis represents the relative effectiveness or response of the biological system or process being studied. The graph shows peaks and valleys, indicating the wavelengths at which the system or process is most and least responsive.It is important to note that the action spectrum does not provide information about the specific molecules or substances involved in the process. It focuses solely on the response of the biological system to different wavelengths of light. To gain a complete understanding of the underlying mechanisms, the action spectrum is often complemented with other techniques, such as the absorption spectrum.ComparisonWhile the absorption spectrum and action spectrum have distinct attributes, they are both valuable tools for studying the interaction of light with matter and biological systems. Let's compare some of their key attributes:1. Unique CharacteristicsThe absorption spectrum is unique to each substance, providing a fingerprint that can be used for identification and characterization. In contrast, the action spectrum can vary depending on the biological system or process being studied, reflecting the specific sensitivities of different organisms or cellular processes to different wavelengths of light.2. Information ProvidedThe absorption spectrum provides information about the wavelengths of light that a substance can absorb most strongly, revealing its electronic structure and composition. On the other hand, the action spectrum provides insights into the relative effectiveness of different wavelengths of light in driving a specific biological or chemical process, without revealing the underlying molecular details.3. RepresentationThe absorption spectrum is typically represented as a graph with wavelength on the x-axis and absorbance or transmittance on the y-axis. Peaks in the graph indicate the wavelengths of maximum absorption. In contrast, the action spectrum is also represented as a graph with wavelength on the x-axis, but the y-axis represents the relative effectiveness or response of the biological system or process being studied.4. ApplicationsThe absorption spectrum is widely used in fields such as chemistry, biochemistry, and spectroscopy for substance identification, characterization, and analysis. It is also utilized in the development of sensors and detectors. On the other hand, the action spectrum finds applications in fields like photobiology, horticulture, and medicine, where understanding the optimal wavelengths for specific biological processes is crucial.5. Complementary NatureWhile the absorption spectrum provides information about the wavelengths of light absorbed by a substance, it does not reveal what happens to the absorbed energy. The action spectrum complements the absorption spectrum by providing insights into the utilization of absorbed light by biological systems. Together, these spectra offer a more comprehensive understanding of the interaction between light and matter.ConclusionIn conclusion, the absorption spectrum and action spectrum are two important tools for studying the interaction of light with matter and biological systems. While the absorption spectrum provides information about the wavelengths of light absorbed by a substance and its electronic structure, the action spectrum describes the relative effectiveness of different wavelengths in driving a specific biological or chemical process. Both spectra have unique characteristics, representations, and applications, and they complement each other in providing a comprehensive understanding of light-matter interactions. By utilizing these spectra, scientists can unravel the mysteries of light and its impact on the world around us. Comparisons may contain inaccurate information about people, places, or facts. Please report any issues. Plants absorb light and convert it into energy for their growth and development. Humans can only see the light of the visible range (400nm - 700nm), while plants can 'see' wavelengths beyond the visible range. The wavelengths ranging from 400nm to 700nm are mostly used by plants for photosynthesis. Thus, the visible light is called photosynthetically active radiation (PAR range). Although plants absorb light of different wavelengths, the absorption of different light colors relies on the help of various pigments. When it comes to plant lighting, it seems the action spectrum and absorption spectrum are nearly identical. But the action spectrum and absorption spectrum are different. Moreover, knowing the differences between the action spectrum and the absorption spectrum helps us understand the light that plants receive and which one is beneficial for their growth and development. If you want to learn more about the action spectrum and absorption spectrum, just read further. What is the action spectrum? The action spectrum is also known as photosynthetically active radiation or PAR range. It refers to the effectiveness of a range of wavelengths to promote photosynthesis. In other words, the action spectrum is the light that plants use most for photosynthesis. It shows that the most efficient light regions for photosynthesis are red light (600 - 700nm), followed by blue light (400 - 500nm), and then green light (500 - 600nm). So, in conclusion, red, blue, and green light (wavelengths between 400 - 700nm) are photosynthetically active and are used most by plants. The action spectrum tells us the light region that stimulates photosynthesis and makes plants become more productive. That is the reason why most LED grow lights are designed with a spectrum in the PAR range while containing more red light and blue light. >> Contact Us To Get Your Efficient Horticulture Lighting Solutions >> What is the absorption spectrum? The absorption spectrum reveals the range of light that plants absorb. Plants absorb different light colors with the help of pigments. The cellular and molecular makeup of plants decides the range of the absorption spectrum. Thus, the absorption spectrum differs from species. The most commonly analyzed pigments are those related to photosynthesis, including chlorophyll A, chlorophyll B, and carotenoids. Chlorophyll A absorbs wavelengths of violet, blue, orange, and red light. While chlorophyll B has an absorption spectrum of blue, green, orange, and red light. Carotenoids, however, have an absorption spectrum between the wavelengths of violet, blue, and green light. Although plants normally absorb all colors of light, the absorption of green wavelengths is much poorer than red and blue light. When plants are hit with sunlight, only a little green light is absorbed, and most of them are reflected back to our eyes. That is why most plants appear green to our eyes. What are the differences between the action spectrum and the absorption spectrum? The action spectrum for photosynthesis is similar to the absorption spectrum for chlorophyll. Because both of them are important for the photosynthesis process. But it is important to note that not all pigments contained in plants are helpful to the photosynthesis process. In addition, not only chlorophyll A and B but also other molecules play essential roles in the process of photosynthesis. The main difference between the action spectrum and the absorption spectrum is that the action spectrum shows the wavelengths used by plants for photosynthesis, whereas the absorption spectrum reveals the wavelengths that are most absorbed by specific molecules. The light that is absorbed and used by plants is different. Here are some differences between the action spectrum and the absorption spectrum: Action spectrum Absorption Spectrum The wavelengths (color of light) are most used by plants to perform photosynthesis. The amount of light of different wavelengths absorbed by a pigment. It represents the relationship between photosynthetic activity in relation to different wavelengths of light. It represents the relationship between the quality of light and the absorbing capacity of pigments The maximum photosynthesis occurs in blue and red light. Chlorophyll absorbs blue and red light, carotenoids absorb violet, blue, and green light. It can be studied by measuring the amount of oxygen evolved, the amount of carbon dioxide absorbed, or the amount of NADP+ reduced. It can be studied using the spectrometer. Photosynthetic pigments absorb light only in the visible region of the spectrum (390nm-760nm).The action spectrum peak of chlorophyll is almost same as that of absorption spectrum indicating that chlorophyll is the primary pigment in photosynthesis. Absorption Spectrum vs Action SpectrumAbsorption Spectrum is the graphic representation of the different wavelengths of light absorbed by the different pigments in a leaf during photosynthesisAction Spectrum is the graphic representation of the effectiveness of different wavelengths of light in photosynthesisPlot showing intensity of light absorbed relative to its wavelengthPlot showing relative efficiency of photosynthesis produced by light of different wavelengthsExplains the relationship between quality of light and absorbing capacity of pigmentsExplains the relationship between photosynthetic activity in relation to different wavelengths of lightChlorophyll absorb blue and red lightCarotenoids absorb violet and blue lightThe maximum photosynthesis occurs in blue and red lightAbsorption of different wavelengths of light by pigments can be measured using spectrophotometer.In action spectrum, the rate of photosynthesis is measured as amount of carbon dioxide fixation, oxygen production, NADP+ reduction etc.Tags Absorption Spectrum vs Action Spectrum Photosynthesis Action spectrum vs absorption spectrum are two elements that many do not know how to differentiate. And, for the correct growth of plants, this is definitely a key point, which is important to understand when developing the cultivation method. Although both are related to light, they are distinct processes that complement each other. If we put a little common sense into it, we can notice that their names give us clues as to what they may mean. On the one hand, the spectrum of action is related to the action of light on the photosynthetic process. While on the other hand, the absorption spectrum reveals to us which colors of light are most absorbed by plant pigments. It is important to remember that not all the pigments contained in plants contribute to the process of photosynthesis, therefore, thanks to the information offered by the absorption spectrum we can know the action spectrum in certain plants. Now, since the other can be derived from one, many tend to be confused or even considered equal. Therefore, we have been in charge of making a differentiation between these two spectrums and telling you how you can use them to your advantage to choose growth lights in your cannabis crops. Difference between action spectrum vs absorption spectrum Although they resemble the relationship with light, there are differences between action spectrum vs absorption spectrum. Let's see, in detail, the characteristics of each of them so that you learn to distinguish them: What is the action spectrum? As we had already told you, the action spectrum is the one that makes known the effectiveness of a specific color of sunlight (wavelengths) to promote photosynthesis. A validated result of the action spectrum, is what we know today as photosynthetically active radiation or PAR range; which is what establishes that the wavelengths (color of light) most used by plants to perform photosynthesis, are those that are contained in the range of visible light, specifically between 400 and 700 nanometers (nm). That is, plants need, compulsorily, the colors that integrate visible light (violet, blue, green, yellow, orange and red) to carry out photosynthesis correctly; using red and blue light to a greater extent. Hence the importance of knowing the action spectrum of our crops, in order to stimulate their photosynthesis and that they can become more productive and healthy. Therefore, to find out the rate of photosynthesis (result of the action spectrum) it is necessary to measure the: Amount of oxygen production(O2) Reducción de Nicotinamide Adenina Dinucleotide Phosphate (NADP+) Fixation of carbon dioxide(CO2) What is the absorption spectrum? The absorption spectrum, on the other hand, reveals the absorption of the different colors of sunlight by the pigments of a plant. The pigments frequently analyzed are those that are related to the photosynthetic process, such as: Chlorophyll A. Chlorophyll B. Carotenoids. Chlorophyll A has an absorption spectrum between the wavelengths of violet, blue, red and orange light. While chlorophyll B absorbs wavelengths of blue, green, orange and red light. In contrast, carotenoids have a spectrum of violet, blue and green light absorption. Although plants usually absorb all of these colors of light, violet, orange, and green light are known to have less absorption than red and blue lights. The latter two being absorbed and processed by the pigments, in greater quantities. Thus converting light energy into chemical energy to achieve photosynthesis. If you want to discover, on your own, the absorption spectrum of a specific plant, you can do so by placing the pigment solution you want to analyze on a spectrometer, and waiting for the team to yield the results you want. Simply put, what we have is that both (action spectrum vs absorption spectrum) possess remarkable differences from each other; and these range from the information they can show us, to the elements they analyze and the ways in which they can be measured. While their similarities are in: the incidence they can have with light and that the reflected data can help us to positively improve our crops. LED grow lights for cannabis: the best technology to take advantage of the action spectrum LED grow lights, although they can be used for any type of plant, are the best technology when growing cannabis in enclosed spaces. And this is because with its high yield you can take advantage of its action spectrum, thus stimulating the growth and proper development of this type of plants. Cannabis, like other species, uses the frequencies of the PAR range to carry out the process of photosynthesis. But, currently, it is known that the light receptors of these plants have the ability to benefit from longer wavelengths than those established by the PAR range. This puts the LED grow lights in a positive scenario. Since its technology provides a full spectrum of light, very similar to that of sunlight; fully covering the needs and demands of our cannabis plants. Let's know the benefits that the different colors of light bring to our crop: PAR range (violet, blue, green, yellow, orange and red light) Blue light and red light are the lengths most absorbed by the cannabis plant. With them, photosynthesis is stimulated to the maximum, allowing their growth levels to increase in a short period of time. During the early stages, blue light contributes to strengthening roots and stems, so that the plant can establish itself correctly. Once the first stages have been passed, blue light will now function as a growth regulating agent; this will allow it not to grow so much vertically but to expand horizontally, increasing its leafiness. Red light, on the other hand, intervenes in the flowering process of cannabis and reinforces the growth process. Exposure to this light improves the quality of the crop, as well as expands the production and concentration of meta-topoline and terpenes. Because red and blue light are considered the most beneficial for plants; many of the creators of LED equipment have limited their lights to producing only these two wavelengths. Therefore, we can find, abundantly, simple LED lights or violets, which lack a full spectrum of light. Well, although violet, green, yellow and orange light are absorbed in smaller quantities and have a less important role in the photosynthetic process than the others, they are still necessary for the quality growth of cannabis plants. Since, these colors contribute to the healthy development of the crop and the metabolization of nutrients. Although, for the most part, they indicate that ultraviolet light becomes harmful to plants, in the case of cannabis, the production of resin in the flowering process has to be favored. Likewise, they come to intervene in the production of cannabinoids and terpenes. This positive incidence between ultraviolet light and cannabis is thanks to the existence of its protective molecules (trichomes), which protect the plant from any negative effect that this type of light may cause. Last but not least, you have distant red light; that although it does not have greater prominence in the process of photosynthesis and is little absorbed by pigments, it comes to help in the process of flowering and germination of cannabis plants. As a conclusion we have that, cannabis plants need for their cultivation, mandatorily, a full spectrum of light, like that offered by high-end LED lights. These, in turn, guarantee the quality and quantity of our crops, since they cover the demands of the plants from germination to harvest. What about the rest of the lights for growth? Although LED grow lights are the best technology to take advantage of the action spectrum, traditional growth lights have not stopped being used, because they are effective – although to a lesser extent – to undertake your cultivation. Its disadvantages are based, mainly, on: CMH grow lights: The spectrum granted by these bulbs is one of the most complete, as they provide a good intensity of red and blue light. Its deficit is that the green and yellow light is in greater proportion than what the plants really need, that is, greater than ten percent (10%). Fluorescent grow lights: This type of luminaire has the same disadvantage as the previous lights. In addition to the fact that its power can play against you, if the cultivation space is large; so you will need to acquire more lights of this type. HPS Grow Lights: These lights, in particular, produce enough red light but sparse blue light; making them deficient during the early stages of vegetative growth. MH Grow Lights: Unlike HPS, MH lights emit enough blue light but little red light. Which considerably affects the flowering stage of crops. For these reasons, traditional growth lights are obscured by the adjustability offered by LED lights, because with them, the production of crops is optimally increased. In that sense, we can precisely notice how important it's important to know the differentiation of action spectrum vs absorption spectrum; therefore, it is in them where the emission of light that the plants receive from the crops is found and through which we can understand which ones work best for their stages of growth and development. Study and Practice for FreeTrusted by 100,000+ Students WorldwideAchieve Top Grades in your Exams with our Free Resources.Practice Questions, Study Notes, and Past Exam Papers for all Subjects! An absorption spectrum is a graph that shows the absorbance of different wavelengths of light by a particular pigmentChlorophylls absorb wavelengths in the blue-violet and red regions of the light spectrumCarotenoids absorb wavelengths of light mainly in the blue-violet region of the spectrumAbsorption spectra of chlorophyll A, chlorophyll B and carotenoid pigmentsAn action spectrum is a graph that shows the rate of photosynthesis at different wavelengths of lightThe rate of photosynthesis is highest at the blue-violet and red regions of the light spectrum, as these are the wavelengths of light that plants can absorb (i.e. the wavelengths of light that chlorophylls and carotenoids can absorb)Photosynthetic Action Spectrum GraphPhotosynthetic action spectrumThere is a strong correlation between the cumulative absorption spectra of all pigments and the action spectrum:Both graphs have two main peaks – at the blue-violet region and the red region of the light spectrumBoth graphs have a trough in the green-yellow region of the light spectrumOverlay of Absorption Spectra and Action Spectra GraphAn overlay of the photosynthetic absorption and action spectra shows there is a strong cumulative correlationDid this page help you? Absorption spectrum shows wavelengths absorbed; action spectrum shows wavelengths triggering a biological activity.Absorption spectrum refers to a spectrum showcasing the specific wavelengths of light that a substance absorbs. Action spectrum, on the other hand, reveals the wavelengths at which a biological process is most effective.While absorption spectrum essentially displays a "fingerprint" of a substance based on the light it absorbs, the action spectrum provides insight into how different wavelengths impact a biological response.In the context of plants, absorption spectrum may detail the wavelengths at which chlorophyll absorbs light most efficiently. Meanwhile, the action spectrum will indicate at which wavelengths photosynthesis occurs at its peak.It is possible for a substance to have an absorption spectrum showing strong absorption at certain wavelengths, but the action spectrum of a related process may not peak at those same wavelengths.To illustrate, a pigment might absorb blue light intensely, as seen in its absorption spectrum, but the biological activity it triggers, like photosynthesis, might be most efficient under red light, as evident in its action spectrum.Shows wavelengths absorbed by a substance.Shows wavelengths where a biological activity is most effective.Identifies "fingerprint" of a substance based on light absorption.Reveals efficiency of biological processes at specific wavelengths.In identifying pigments in plants.In determining peak photosynthetic activity.Does not directly indicate biological effectiveness.Directly tied to a biological outcome.A chart displaying how much light a substance takes in across different wavelengths.Scientists use the absorption spectrum to identify unknown materials.A profile of how different light wavelengths influence a specific biological activity.The action spectrum for vision differs among nocturnal and diurnal animals.A depiction of the light energy absorbed by a substance at varying wavelengths.The absorption spectrum of a gas can be distinctive, allowing for its identification.A graphical representation indicating the efficiency of a biological process at different wavelengths.The action spectrum of photosynthesis revealed its highest efficiency under red light.A graphical representation of wavelengths absorbed by a substance.The leaf's absorption spectrum showed peaks in the blue and red regions.A chart showing the effectiveness of physiological responses across various wavelengths.Studying the action spectrum can help understand which light promotes plant growth.The spectrum showing which wavelengths are absorbed by a specific substance.By analyzing the absorption spectrum, researchers can determine the properties of various pigments.A depiction of which wavelengths are most effective in triggering a certain biological process.The action spectrum for human skin indicates the wavelengths most responsible for sunburn.A profile illustrating light absorption intensity for different wavelengths.Chlorophyll's absorption spectrum is vital for understanding plant photosynthesis.The spectrum that displays the relative efficacy of different wavelengths in a biological function.By examining the action spectrum, scientists discerned the best light for algae growth.Studying the action spectrum can help understand which light promotes plant growth.By examining the action spectrum, scientists discerned the best light for algae growth.The action spectrum of photosynthesis revealed its highest efficiency under red light.The action spectrum for vision differs among nocturnal and diurnal animals.While absorption spectrum shows wavelengths absorbed by a substance, action spectrum reveals the wavelengths at which a biological process is most effective.No, the absorption spectrum only shows what wavelengths are absorbed; the biological impact is indicated by the action spectrum.Absorption spectrum is a graphical representation displaying the specific wavelengths of light that a substance absorbs.Yes, technologies like spectroscopy utilize the absorption spectrum for material identification and analysis.Potentially, genetic or biochemical modifications might shift the action spectrum for certain processes.The action spectrum for human skin indicates the wavelengths most responsible for sunburn.The action spectrum provides insight into how different wavelengths impact a specific biological response, aiding in understanding and optimizing processes like photosynthesis.The absorption spectrum helps researchers identify and characterize substances based on the light they absorb.Absorption spectrum displays the light wavelengths a substance absorbs, while action spectrum reveals the efficiency of biological processes at those wavelengths. They relate in the context of light interactions but differ in their implications and applications.Other pigments and factors can influence photosynthesis, so the most effective wavelength for the process may not match chlorophyll's peak absorption.Absolutely, understanding the action spectrum can guide the use of specific light conditions to boost crop yield or growth rates.Yes, a substance may absorb light best at certain wavelengths (absorption spectrum) but the associated biological activity might be most efficient at other wavelengths (action spectrum).Understanding both can help optimize light conditions for growth, as the plant may absorb light best at certain wavelengths but photosynthesize most efficiently at others.No, absorption spectrum simply shows the wavelengths a substance absorbs, irrespective of any biological outcome.Yes, two substances might have similar absorption patterns, but they can still be chemically distinct.Yes, the action spectrum can be used for any organism to determine the efficacy of biological processes at different wavelengths.All substances that interact with light have an absorption spectrum, though it may not always be significant or easy to measure.Understanding the action spectrum can guide the use of specific light wavelengths for therapies or highlight harmful wavelengths, like UV causing skin damage.Yes, an organism can have different action spectra for distinct biological activities, like photosynthesis and vision in plants.Not always, because the efficiency of a biological process may be influenced by factors other than just light absorption.Yes, action spectrum specifically relates to the effectiveness of biological processes across various wavelengths.Income vs. WealthOxidation vs. ReductionHarlon MossHarlon is a seasoned quality moderator and accomplished content writer for Difference Wiki. An alumnus of the prestigious University of California, he earned his degree in Computer Science. Leveraging his academic background, Harlon brings a meticulous and informed perspective to his work, ensuring content accuracy and excellence.Janet WhiteJanet White has been an esteemed writer and blogger for Difference Wiki. Holding a Master's degree in Science and Medical Journalism from the prestigious Boston University, she has consistently demonstrated her expertise and passion for her field. When she's not immersed in her work, Janet relishes her time exercising, delving into a good book, and cherishing moments with friends and family.Exploring the nuances of the world around us. Difference.Wiki is your trusted source for understanding the contrasts and comparisons that matter. Stay curious, stay informed.abcdefghijklmnopqrstuvwxyz