Edexcel (B) Biology A-level

5.6 - Photosynthetic pigments

Flashcards

What is an absorption spectrum?

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Graph that shows the percentage of each wavelength of light that a pigment absorbs.

What is an action spectrum?

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Graph that shows the overall rate of photosynthesis at each wavelength of light. Strongly corresponds to absorption spectrum of chlorophyll a (the most abundant pigment).

Suggest how changing wavelength of light affects rate of photosynthesis.

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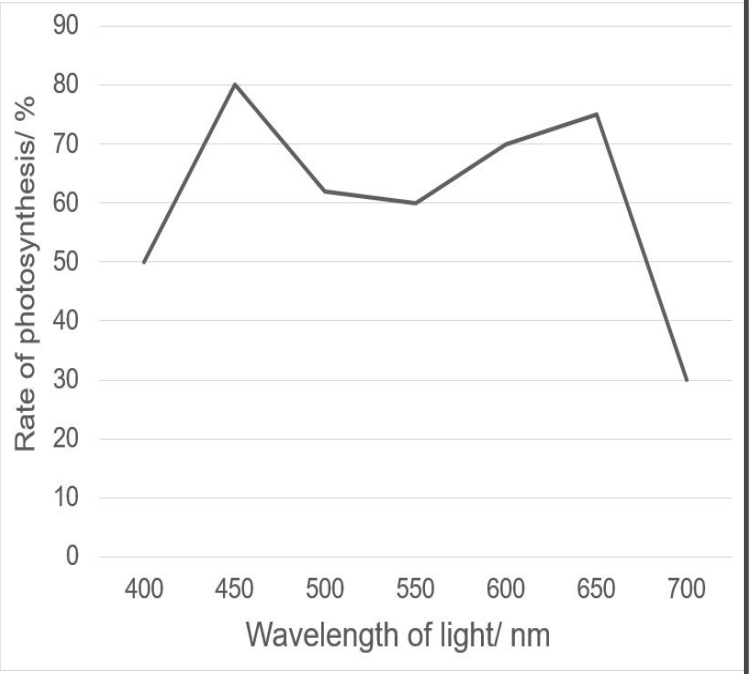
Highest rate in violet range ≈ 450

Chlorophylls reflect green light so rate slows 490 - 570

Rate increases in orange range 590 - 620

Slowest rate above 650



Name the 2 main groups of photosynthetic pigment.

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- Chlorophyll (made of chlorophyll a & chlorophyll b)
- Carotenoids (carotene & xanthophylls)

Where are photosynthetic pigments found?

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Embedded in thylakoid membrane within chloroplasts.

Explain the role of chlorophyll a.

Explain the role of chlorophyll a.

Primary photosynthetic pigment.

Mainly absorbs wavelengths in violet-blue (430 nm) & orange-red (662 nm) parts of spectrum.

Emits electrons after absorbing photons of light.

Explain the role of chlorophyll b.

Explain the role of chlorophyll b.

Accessory pigment with absorption peaks 453 nm & 642 nm.

Explain the role of carotenoids.

Explain the role of carotenoids.

Act as antioxidants to prevent damage to other pigments via non-photochemical quenching of excess photons.

Mainly absorb wavelengths in the blue-green part of the spectrum.

Why do many plants have a variety of photosynthetic pigments?

Why do many plants have a variety of photosynthetic pigments?

To widen the range of wavelengths of light they can absorb to ensure maximum rate of photosynthesis. Particularly important for plants in shaded conditions.

State the purpose and principle of paper chromatography.

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Molecules in a mixture are separated based on their **relative attraction** to the mobile phase (**running solvent**) vs the stationary phase (**chromatography paper**).

Outline a method for extracting photosynthetic pigments.

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Use a pestle and mortar to grind a leaf with an extraction solvent e.g. propanone.

Outline how paper chromatography can be used to separate photosynthetic pigments.

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1. Use a capillary tube to spot pigment extract onto pencil ‘start line’ (origin) 1 cm above bottom of paper.
2. Place chromatography paper in solvent. (origin should be above solvent level).
3. Allow solvent to run until it almost touches the other end of the paper. Pigments move different distances.

What are Rf values? How can they be calculated?

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Ratios that allow comparison of how far molecules have moved in chromatograms.

Rf value = distance between origin and centre of pigment spot / distance between origin and solvent front.