

READING PASSAGE 1

You should spend about 20 minutes on **Questions 1-13**, which are based on Reading Passage 1 below.

DISCOVERING PURPLE

For thousands of years, dyes used to colour textiles and other materials were made from only natural sources. Historically, coloured dyes were made from the roots and leaves of plants, and from certain animals. Among the most precious of the animal-based dyes was the purple colour extracted from snails. This dye was very difficult to obtain and was therefore outrageously expensive. What was more, colours from natural dyes tended to be quite dull, and they faded when exposed to sunlight. But all this changed in 1856, when a London teenager made an important discovery.

William Perkin was born on March 12, 1838, in London, England. His father was a builder, and the family lived in fairly prosperous circumstances in an otherwise rather disreputable neighbourhood in the city's East End. As a boy, Perkin's curiosity prompted early interests in the arts, sciences, photography, and engineering. But then one day, when he was exploring his late grandfather's home, he happened to come across a run-down, yet functional, laboratory, and this solidified his passion for chemistry.

As a student at the City of London School, Perkin became immersed in the study of chemistry. His teacher, Thomas Hall, encouraged him to attend a series of lectures given by eminent scientist Michael Faraday at the Royal Institution. Those speeches fired the young chemist's enthusiasm further, and he became determined to attend the Royal College of Chemistry. Perkin's father hoped to convince his bright young son to follow in his older brother's footsteps into the more respectable field of architecture, so he tried to prevent this at first. But pressure from Hall and the wishes of his son won out, and Perkin entered the Royal College of Chemistry in 1853, at the age of 15. At the time of Perkin's enrolment, the college was headed by noted German chemist August Wilhelm Hofmann. Perkin's scientific gifts soon caught Hofmann's attention, and within two years, he became Hofmann's youngest assistant. Not long after that, Perkin made the discovery that would make him both famous and wealthy.

In 1856, the only viable medical treatment for the deadly disease malaria was quinine, derived from the bark of the cinchona tree native to South America. Demand for this drug was surpassing the available supply. Thus, when Hofmann made some passing comments about the desirability of a synthetic substitute for quinine, it is unsurprising that his star pupil was moved to take up the challenge.

During his spring school holidays that year, Perkin spent his time at home attempting to manufacture the drug from aniline, a by-product from the manufacture of the gas that lit London's streets. Despite his best efforts, however, he did not end up with quinine. Instead, he produced a mysterious dark sludge. Luckily, Perkin's scientific training and nature prompted him to investigate the substance further. Incorporating potassium dichromate and alcohol into the aniline at various stages of the experimental process, he finally happened upon a deep purple solution. Perkin quickly grasped that his purple solution could be used to colour fabric, thus making it the world's first synthetic dye.

Perkin asked advice of Scottish dye works owner Robert Pullar, who convinced him that manufacturing the dye would be well worth it if the colour remained fast and the cost was not prohibitive. Thus reassured, he decided to pursue his commercial plans. Over the fierce objections of his mentor Hofmann, Perkin left college to give birth to the modern chemical industry. He was still only eighteen years old.

With the help of his father and brother, Perkin set up a factory on a site near the Grand Union Canal in Greenford Green, not far from London. Utilising the cheap and almost unlimited supply of aniline available in the city, it began producing the world's first synthetic dye in 1857. Perkin originally called his dye 'Tyrian Purple' or 'aniline purple', but then decided to call it 'mauve', after the French word for the mallow plant used to make the colour violet. This was the name he fixed on in 1859, and is the name still in use to this day.

The company received an unexpected commercial boost from the Empress Eugenie of France when she decided the new colour flattered her, and it soon became the must-have shade for all the fashionable ladies of France. Not to be outdone, England's Queen Victoria also appeared in public wearing a gown of the same hue, thus making it all the rage in England as well. The dye was bold and fast, and the public wanted more. So Perkin went back to the drawing board, and between 1859 and 1864 he developed several more synthetic dye colours.

It is important to note that Perkin's synthetic dye discoveries had effects far beyond the merely decorative. The dyes also became vital to medical research in many ways. For instance, they were used to stain previously invisible microbes and bacteria, allowing researchers to identify such bacilli as tuberculosis, cholera, and anthrax.

Questions 1 – 7

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 1 - 7 below.

The first synthetic dye

Traditional dyes:

- made from plants, or animals e.g. 1
- purple dye was hard to obtain and extremely 2

William Perkin:

- found an old 3 in grandfather's house and decided to study chemistry
- 1856: was trying to find a way to make the drug called 4
- created a purple solution from aniline, a by-product of the 5 industry
- 1857: began manufacturing dye in his 6 near London
- 1859: called his dye 7

Questions 8 – 13

Do the following statements agree with the information given in the text?

In boxes 8 - 13, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

8 Hofmann noticed that Perkin had a talent for chemistry.

9 Hofmann asked Perkin to do some experiments at home during the holidays.

10 Perkin faced challenges obtaining the raw material needed to produce his dye.

11 Perkin personally sent his new colour directly to the Empress Eugenie.

12 The popularity of Perkin's product at home and abroad led to demand for additional colours.

13 Perkin's dyes enabled scientists to see certain microbes and bacteria for the first time.