

Exemplar exam question – Option F

- 1** This question is about colours in food.
- a** Distinguish between a **dye** and a **pigment**. [2]
 - b** Explain in terms of the light absorbed why strawberries are red. [1]
 - c** State what type of pigment is responsible for the red colour of strawberries. [1]
 - d** The structure of chlorophyll is shown in the data booklet. With reference to this structure, explain why peas change colour when boiled in an acidic solution. [2]
 - e** State the name of the pigment responsible for the purple-red colour of fresh meat and explain the type of packaging generally used for a piece of beef. [4]

Commentary

- a** A dye is a food-grade, synthetic, water-soluble colorant. [1]
 A pigment is a naturally occurring colorant found in the cells of plants and animals. [1]

These are straightforward statements from the syllabus.

- b** Strawberries absorb the complementary colour to red (green) and reflect red light. [1]

Although the question is only one mark, more than just ‘strawberries reflect red light’ will probably be required. It is difficult to know if it is necessary to learn all the complementary colours, but this has not generally been required for HL questions on transition metals and so is probably not required.

- c** Anthocyanins are responsible for the red colour of strawberries. [1]

Much detail is given on this Option in the syllabus and many foodstuffs are mentioned by name. It is probably likely then that specific details of all the foods will be required for the examinations. These are covered in Option F Food Chemistry on the *Chemistry for the IB Diploma* CD-ROM.

- d** In acidic solution the Mg^{2+} at the centre of the ring is replaced by 2H^+ . [1]
 The olive-green pheophytin complex is formed. [1]

The structure of chlorophyll is shown in Table 22 (page 36 of the data booklet). Specific reference to the structure of chlorophyll should be made in this answer and the first point covers this.

- e** The pigment is myoglobin. [1]

With three marks available for the rest of the question, it probably requires a description of the type of packaging and the reason for it. There are several points that could score marks and it is safer to consider all the relevant points to ensure that full marks are awarded.

- Packaging films with low gas permeability are used. [1]
- CO_2 is used as a storage gas. [1]
- CO_2 reduces oxidation of oxymyoglobin and myoglobin by oxygen. [1]
- Oxidation causes a change in oxidation state of the heme iron from +2 to +3. [1]
- Oxidation of myoglobin/oxymyoglobin forms the brown metmyoglobin, which makes the meat appear undesirable. [1]

maximum of 3 marks