**The National Orthodox School / Shmaisani**

 **Subject: Biology Worksheet : Photosynthesis**

 **Name:**

 **Date:** **Grade 9 IB**

**1.** **The apparatus shown was used to investigate the effect of varying carbon dioxide concentration on the rate of photosynthesis. Carbon dioxide concentrations were varied by adding different amounts of sodium hydrogen carbonate (NaHCO3) to water.**



**What is the dependent variable in this investigation?**

A. Temperature

B. Light intensity

C. Amount of NaHCO3 added

D. Volume of oxygen produced

**2. What does an action spectrum for photosynthesis show?**

A. The range of conditions over which photosynthesis can occur in a plant

B. The percentage of light absorbed at each wavelength by photosynthetic pigments

C. The percentage of light absorbed at each energy level by a plant

D. The relative amount of photosynthesis at each wavelength of light

**3. If a plant is exposed to light, which colour of light would lead to the lowest rate of oxygen release by a green plant?**

A. Blue

B. Red

C. Green

D. White

**4. What does the Rf value in thin layer chromatography represent?**

A. The distance travelled by the pigment front in a fixed time period

B. The distance from the origin to the solvent front at the end of the experiment

C. The ratio of distances travelled by the pigment and solvent fronts

D. The concentration of the pigment applied to the chromatography plate

**5a. To investigate whether carbon dioxide is required for photosynthesis, a plant was irrigated using water from which carbon dioxide had been removed and was then placed in the apparatus shown in the diagram. The apparatus was left in darkness for 24 hours to destarch the leaves. Then, after several hours in light, a leaf was removed from the plant and found to contain no starch when tested. A control was performed using a second plant. A leaf from this plant tested positive for starch.**

**Describe the control for this experiment.**

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**5b. Outline how the carbon dioxide could be removed from the water used to irrigate the plant.**



**5c. Suggest how a plastic bag placed around the plant pot prevents carbon dioxide from reaching the plant’s leaves.**



**5d. A chromatograph was made of the photosynthetic pigments of a leaf of the plant.**



Outline what measurements would be taken to identify pigment X.

**6. The graph shows the absorption spectra of chlorophyll a and chlorophyll b.**



**What can be concluded from the graph?**

A. Both chlorophyll a and chlorophyll b absorb a large amount of green light

B. Chlorophyll b absorbs red light more efficiently than blue light

C. Other pigments must absorb light between blue and red in the spectrum

D. Chlorophyll a and chlorophyll b have different absorption peaks

**7a. A variegated *Pelargonium* plant was grown outdoors in a plant pot. Figure 1 shows one leaf of the *Pelargonium*. The plant was left in the dark for 24 hours to inhibit photosynthesis. After this time, a sketch was made of the leaf to show the colours (Figure 2), then part of the leaf was covered with black card (Figure 3). Following the exposure of the plant to sunlight for six hours, the black card was removed and the leaf tested for starch (Figure 4).**



Outline a reason for inhibiting photosynthesis for 24 hours.



**7b. Identify which two areas, W, X, Y or Z, in Figure 4 show that light is required for photosynthesis.**

**7c. Identify which two areas, W, X, Y or Z, in Figure 4 show that chlorophyll is required for photosynthesis.**

**7d. Using the axes, sketch the action spectrum for photosynthesis in the green area of the leaf in Figure 1.**



**7e. Predict how the action spectrum from the white areas of the leaf would differ from the green areas.**



 **8.**



