

Worksheet 4

SEA FIREFLIES

The species *Cypridina hilgendorffii* can be found off the south coast of Japan. This nocturnal crab is also called a sea firefly because of its ability to glow. They live in sandy grounds and feed on plankton. Whenever they feel threatened, they secrete a luminescent liquid. In this bioluminescence reaction, vargula luciferin is oxidized to vargula oxyluciferin by vargula luciferase without the need for ATP. The resulting light appears blue, with a luminous efficiency of about 30%.

Activity 2 – BIOLUMINESCENCE

I) Preparation

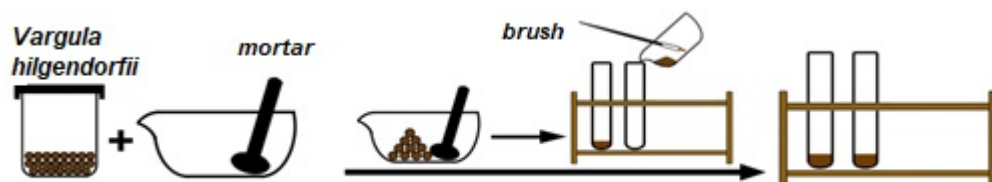
List of materials:

- A pipette
- Two test tubes
- A bristle brush
- A kettle
- A small pestle and mortar
- 30 dried *Vargula hilgendorffii*

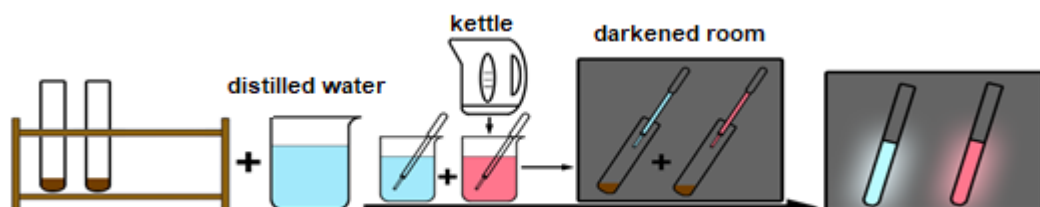
Important: All materials must be completely dry!

II) Setup and procedure

- 1) Grind 15 *Vargula hilgendorffii* using the small mortar. The resulting powder is swept into two dry test tubes using the bristle brush.



- 2) In a darkened room, 2 ml cold water (20 °C) are pipetted into one of the test tubes; 2 ml hot water (80 °C) from the kettle are pipetted into the other one.



III) Observation

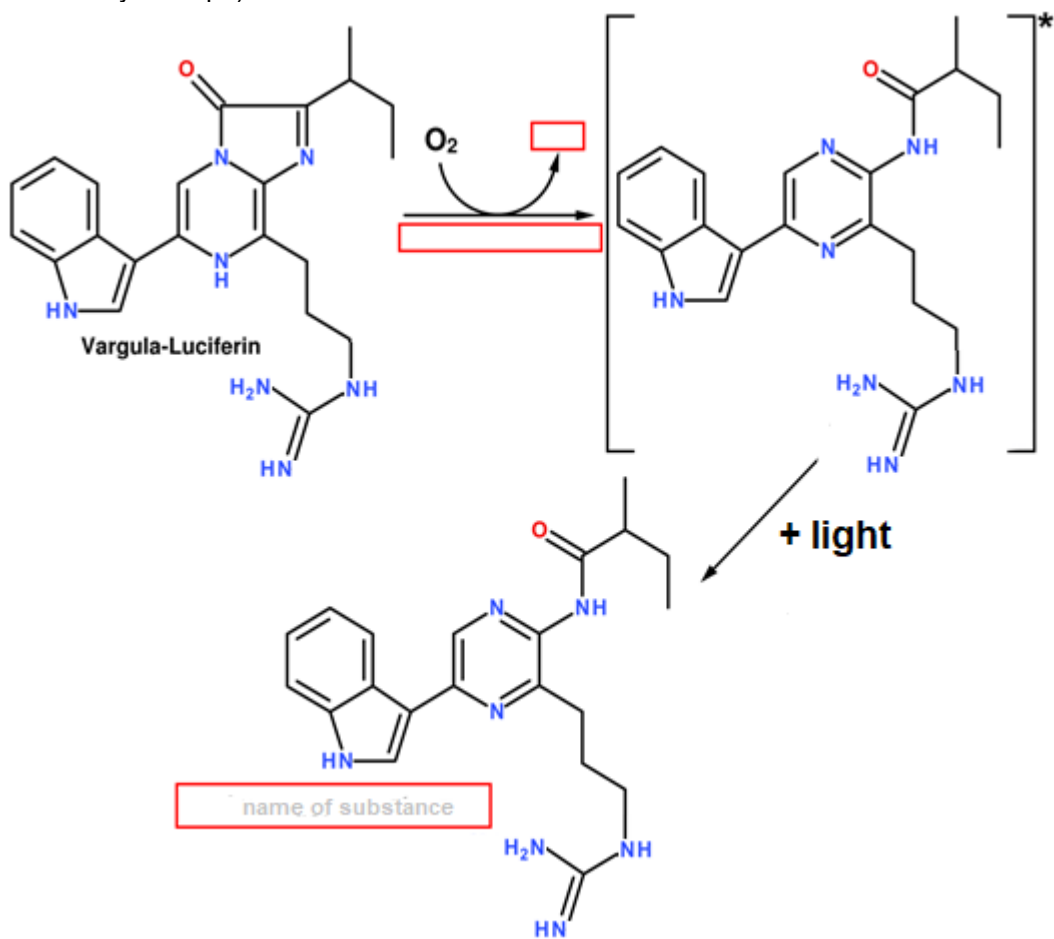
1) What can you see after water has been added?

2) What influence does the temperature of water have on the reaction?

IV) Interpretation

1) Try to fill in the gaps (red boxes) in the reaction process below.

(Tip: compare the starting material and end products – whenever atoms are missing, where do they end up?)



2) Why does the water's temperature have an effect on the reaction?

(Tip: What are enzymes made up of? What happens if these compounds are heated?)
