**Detection of Life Experiment – Teacher Guide**

*In the kit: dimple tile (on paper), starch granules, yeast granules, sand, alka seltzer (crushed), empty dropper bottle for water*

*Obtain iodine solution*

**This experiment is about the characteristics of life, how we can identify life and what the implications might be for the search for life elsewhere.**

This demonstration will show that some chemical reactions can appear to show ‘activity’ and yet are not life. To determine whether something contains life we often need more than one life detection method. This activity could occur around a discussion on the characteristics of life or a discussion on the chemistry of living things. A good space mission context is to talk around the problems that the Viking Lander on Mars had in detecting life (it detected oxygen gas evolved from soil which is thought to have been caused by chemical ingredients in the soils like hydrogen peroxide reacting with nutrients that were added to the soil to test for life). The discussion can include how an active chemical reaction can easily confuse us into thinking we have found life.

For each group, prepare a dimple tile with each of the following in a separate dimple:

* Starch powder
* Yeast granules
* Sand
* Alka seltzer

Fill your empty dropper bottles with water.

Ask each group to add three or four drops of water to each of the four components. What do they see? (Remember not to identify what is in the wells!).

* The starch powder will be unreactive and show no obvious signs of activity.
* The yeast granules will swell and may show signs of some gas bubbles.
* The sand will show no signs of activity.
* The alka seltzer will fizz as if it is some sort of active metabolic process.

This test can be followed with a discussion to identify which wells contain active life. The discussion might focus on the apparent activity of the alka seltzer well.

Now ask each group to add a drop of iodine solution to each well. In contact with sugars (carbohydrates) the iodine will go purple. The relatively inactive starch will go purple, the yeast granules will go purple, but neither the sand or alka seltzer go purple.

The discussion can then revolve around the results: the starch was very inactive with water, but with iodine is clearly of biological origin. The yeast was suspected of being biological and is shown to be with iodine. The sand is inert with water and with iodine, it is not biological. The surprise is alka seltzer, which fizzed like active life with water, but contains no sugars – it must be a chemical reaction showing how chemistry can sometimes lead us to make conclusions that something is life when it is not.