**Lab 4 – Energy Sources and Alternative Energy**

**Experiment 1: The Effects of Coal Mining**

Coal mining, particularly surface mining, leads to large areas of land being temporarily disturbed. Mines collect and conduct water that is in contact with pyrite, a mineral that produces iron and sulfuric acid when exposed to air and water. Limestone is often used to mitigate the effects of pyrite on water. In this lab, you will see first-hand the reasons why mine drainage can be harmful to the local drainage system if left untreated.

**POST-LAB QUESTIONS**

1. **Develop hypotheses predicting the effect of pyrite and limestone on water acidity? Why would you predict these effects?**
2. Pyrite hypothesis =
3. Limestone hypothesis =

|  |  |  |
| --- | --- | --- |
| **Table 1: pH of Water Samples** | | |
| **Water Sample** | **Initial pH** | **Final pH** |
| **Pyrite** |  |  |
| **Limestone** |  |  |
| **Water** |  |  |

1. **Based on the results of your experiment, would you reject or accept each hypothesis that you produced in question 1? Why?**
   1. Pyrite hypothesis accept/reject =
   2. Limestone hypothesis accept/reject =
2. **Based on your data, what effect do you predict coal mining has on the environment?**

Answer =

1. **Based on your data, why would you use limestone to treat acid mine damage? Utilize at least one scholarly resource to support your suggestions.**

Answer =

**Experiment 2: Solar Energy**

The sun’s energy is free, plentiful, non-polluting, and can be converted into electricity with the use of photovoltaic cells. Also called a solar cell, these panels capture sunlight and emit a current that can be used to power many things, including the small motor attached to the solar panel in your kit. In this experiment, you will investigate how the amount and wavelength of light affect the generation of electricity.

**Post-Lab Questions**

1. **Develop hypotheses predicting the efficiency of solar energy from direct sunlight against the four variables tested.**

Direct vs indirect (at an angle) hypothesis =

Direct vs reflected (using aluminum foil reflector) hypothesis =

Direct vs shaded (covering the solar panel) hypothesis =

Direct vs filtered (using color filtration) hypothesis =

|  |  |
| --- | --- |
| **Table 2: Solar Energy Experiment Results** | |
| **Environmental Descriptor/Variable** | **Observations**  **(Each should be compared against direct subnlight)** |
| **Weather** |  |
| **Motor speed in direct sunlight** | **VF F M S NM** |
| **Motor speed at 45 degree angle** | **VF F M S NM** |
| **Motor speed with 25% shaded** | **VF F M S NM** |
| **Motor speed with 50% shaded** | **VF F M S NM** |
| **Motor speed with 75% shaded** | **VF F M S NM** |
| **Motor speed under reflectors** | **VF F M S NM** |
| **Motor speed under red filtration** | **VF F M S NM** |
| **Motor speed under blue filtration** | **VF F M S NM** |
| **Motor speed under green filtration** | **VF F M S NM** |
| **Motor speed under yellow filtration** | **VF F M S NM** |

1. **Based on the results of your experiment, would you reject or accept each hypothesis that you produced in question 1? Explain how you determined this.**

Direct vs indirect accept/reject =

Direct vs reflected accept/reject =

Direct vs shaded accept/reject =

Direct vs filtered accept/reject =

1. **Does increased exposure to the sun’s light produce more current? Explain how you know this based on your data?**

Answer =

1. **How could you increase the electricity generated by a solar cell during the day when the sun’s angle is constantly changing?**

Answer =

1. **Based on your data, could adding filters to solar panels increase the solar energy produced? Explain how you know this.**

Answer =

**References**

Any sources utilized should be listed here.