Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lab Day & Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Data Sheet

### A Spontaneous Reaction

**Table I.** Results of test of reaction of metals in solutions

|  |  |  |  |
| --- | --- | --- | --- |
| Metal | Solution | Observations | Spontaneous? |
| Cu(s) | ZnSO4(aq) |  | Yes No |
| Zn(s) | CuSO4(aq) |  | Yes No |
| Write the net ionic equations for each spontaneous reaction observed: | | | |

### A Non-spontaneous Reaction

**Table II.** Assessing the level of work required to operate a DC Generator

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Task # | Task Description | Load Level  (low, medium, or high) | Comments/Observations | |
| 1 | Load Free – Clips not touching |  |  | |
| 2 | Load to Light 6 V Flashlight Bulb |  |  | |
| 3 | Load to Drive Reaction of Cu(s) in ZnSO4(aq) |  |  | Describe Color Change |
| Cu(s) #1 |  |
| Cu(s) #2 |  |
| Solution |  |
| 4 | Voltmeter | Initial Reading:  Reading after switching electrodes:  What this apparatus represents: | | |

**Table III.** Electrode Clean-up

|  |
| --- |
| Observations on adding HCl(aq) to the dirty Cu electrode: |
| What was the material on the copper strip? |
| What was the material on the zinc strip? |

## Post-Lab Questions:

1. What is a “spontaneous” chemical reaction?
2. How is work related to whether a chemical reaction is spontaneous or nonspontaneous?
3. Give the net ionic equation for the reaction that takes place when the copper electrode is cleaned.