Cell Potentials and Reduction Potentials: Worksheet

Reference: 17.6 (pg. 711 – 716)

1. What is the difference between E_{cell} and $E°_{cell}$? Be specific.
2. If Galvanic cells have a maximum voltage of only a few volts, how is it possible that a 9-volt battery (or greater) can exist?
3. What is meant by reduction potential?
4. When two half-cells are connected, how is it possible to determine which will gain electrons?
5. Look at the diagram on pg. 710. Which half-cell has the greater reduction potential? How can you tell?
6. For PE 5 on pg. 711. Which half-cell has the greater reduction potential?
7. What equation is used to calculate $E°_{cell}$?
8. For the silver-copper cell, $E°_{cell} = E°_{Ag+} - E°_{Cu2+}$. What would $E°_{cell}$ equal if $E°_{Ag+}$ was 0.96 V and $E°_{Cu2+}$ was 0.34 V?
9. What problem is associated with assigning reduction potentials? How is this overcome?
10. On pg. 713, half-cell equations are shown for copper and hydrogen. Based on these equations, which half-cell has the greatest reduction potential?
11. On pg. 714, explain where the 0.00 V in "0.34 V = $E°_{Cu2+}$ - 0.00 V" comes from and why the value is zero.
12. What does a negative E° value indicate about a half-cell?
13. The double arrows in table 17.1 are not meant to suggest that an equilibrium exists. What do they indicate?
14. Solve for PE 6 (pg. 716). Show your work.
15. What is the maximum voltage that can be produced by a single cell under standard conditions (25°C and 1 M solutions)? Explain.
16. What would the voltage be in the following cells:a) Ni - Au, b) Ag - Cu, c) Mg - Al, d) Cu - Fe?
17. Is it accurate to say that $E°_{cell} = E°_{\text{larger reduction potential}} - E°_{\text{smaller reduction potential}}$? Explain with reference to equation 17.2 on pg. 712.
18. Will the voltage from a cell always be positive? Why or why not?