

Chemguide – questions

STANDARD ELECTRODE POTENTIALS

1. a) Draw a fully labelled diagram showing how you could measure the E^0 value for the Mg^{2+}/Mg system using a standard hydrogen electrode. Your diagram should show all the essential conditions for the experiment. (The Mg^{2+}/Mg system means having magnesium metal in contact with Mg^{2+} ions.)
- b) How would you modify the experiment to find the E^0 value for the Ag^+/Ag system?
- c) The E^0 values for the two systems are found to be

	E^0 (volts)
$Mg^{2+}_{(aq)} + 2e^- \rightleftharpoons Mg_{(s)}$	-2.37
$Ag^+_{(aq)} + e^- \rightleftharpoons Ag_{(s)}$	+0.80

Explain why the magnesium value is negative.

- d) By considering these values, explain which of the two metals, magnesium or silver, more readily forms positive ions in solution.

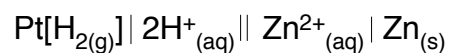
Now consider these E^0 values:

	E^0 (volts)
$Cu^{2+}_{(aq)} + 2e^- \rightleftharpoons Cu_{(s)}$	+0.34
$Fe^{2+}_{(aq)} + 2e^- \rightleftharpoons Fe_{(s)}$	-0.44
$Pb^{2+}_{(aq)} + 2e^- \rightleftharpoons Pb_{(s)}$	-0.13

- e) Which of these three metals forms 2+ ions most readily?
- f) Which of these equilibria lies furthest to the right?
- g) Which of these 2+ ions would be easiest to convert to the metal?
- h) Now considering all five of the equilibria in the two tables above, which 2+ ions would be most difficult to convert to the metal?

Chemguide – questions

2. a) Explain exactly what the following diagram shows:



- b) The E^0 value for this combination is -0.76 volts. Which of the two electrodes of the cell (the platinum or the zinc) is positive and which is negative?
- c) Explain your answer to part (b) in terms of the equilibria involved.