Friday Worksheet **Name: …….**

Electroytic cells worksheet 6

1) Fill in the gaps of the following using the words below. Words can be used more than once or not at all.
Two, three, six, energy, negative, positive, adhere, galvanic, spontaneous, primary, secondary, chemical, kinetic, electrical.

a) A lead-acid battery is made up of _____ lead-acid galvanic (voltaic) cells connected up in series each delivering _____ volts to give a total of 12 volt output.

b) When a lead-acid battery cell is producing electricity (discharging) it is converting _____ energy into _____ energy. This involves a _____ redox reaction.

c) Lead-acid cells are rechargeable because the reaction products _____ to the electrodes.

d) A galvanic cell, such as the lead-acid car battery, can be recharged by connecting the negative terminal of a battery charger to the _____ terminal of the galvanic cell and the positive terminal of a battery charger to the _____ terminal of the galvanic cell.

e) Recharging a lead-acid cell is a non-spontaneous electrolytic process because it requires the input of _____

f) Galvanic cells which can be recharged are known as _____ cells

2) The overall reaction that takes place as the battery discharges is given below.
$Pb(s) + PbO_2(s) + 4H^+(aq) + 2SO_4(aq) \Rightarrow 2PbSO_4(s) + 2H_2O(l)$

i. What is the half reaction taking place at the anode?

ii. What is the half reaction taking place at the cathode?

iii. What happens to the pH of the electrolyte as the battery is discharging?

iv. What is the composition of the electrode at the:
- anode

- cathode

v. Why can this cell be recharged?

3) A lead acid battery is connected to a recharger as shown on the right.

a) Identify the anode and cathode for each image shown on the right.

b) As the battery is recharging, what is the half equation for the reaction that occurs at the

i. positive electrode.

ii. negative electrode

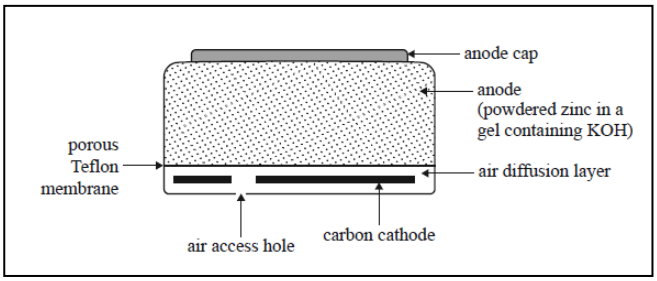
c) What is happening to the pH of the electrolyte during recharging?

4) A zinc-air button cell is used in hearing aids and a simplified diagram is shown below. The anode is in the form of powdered zinc dispersed in gel that contains KOH as the electrolyte. The cathode is composed of a carbon disc.

The overall reaction is shown on the right.

$2Zn(s) + O_2(g) + 2H_2O(l) \Rightarrow 2Zn(OH)_2(s)$

a) Write the half reaction that occurs at the anode



b) Write the half reaction that occurs at the cathode

c) What is the purpose of the KOH in the battery?

d) This zinc-air button cell is run for 5.0 hours at a steady current of 2.45 mA. What mass of zinc hydroxide is formed?