Friday Worksheet **Name: …….**

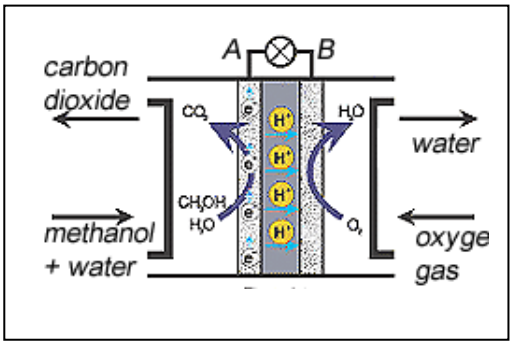
Fuel cells worksheet 5

1) A hydrogen-oxygen fuel cell uses 1.00×10^{-3} mol of hydrogen gas per minute of operation. What is the current produced by this cell?

2) Liquid methanol is a fuel for small fuel cells that are used to power laptop computers and similar small electrical items. The methanol is oxidised by atmospheric oxygen to carbon dioxide and water using an acidic electrolyte.
- Write half-equation for the reaction taking place at anode

-- Write half-equation for the reaction taking place at cathode

3) A fuel cell can be constructed that uses the following two half-reactions.
$CO_2(g) + 6H^+(aq) + 6e \Rightarrow CH_3OH(aq) + H_2O(l)$ $E^o = +0.05$ V
$O_2(g) + 4H^+(aq) + 4e \Rightarrow 2H_2O(l)$ $E^o = +1.23$ V



a) Label the anode and cathode in the diagram

b) Label the direction of electron flow.

c) Label the direction of positive ion flow.

d) What are the polarities of each electrode

e) At which electrode< anode, cathode or neither, will
   i. H^+ ions be consumed

   ii. H_2O be formed

   iii. CO_2 be consumed

   iv. methanol be reduced.

f) Indicate which of the following statements about this fuel cell are true or false and give an explanation.
A. An external power supply is used to recharge the cell.
B. Gaseous products are recycled into the cell to improve efficiency.
C. Chemical energy is not completely converted into electrical energy.
D. More H^+ ions are produced at the anode than are consumed at the cathode.