Please fill in your names and A00 numbers on the scantron and bubble in the correct answers

1. Identify the spectator ion(s) in the following reaction.
   $Zn(OH)_2(s) + 2K^+(aq) + 2OH^-(aq) \rightarrow 2K^+(aq) + Zn(OH)_4^-(aq)$

   a) K^+ and OH^-
   b) $Zn(OH)_2$
   c) K^+
   d) K^+ and $Zn(OH)_4^{2-}$
   e) $Zn(OH)_4^{2-}$

2. Analysis of a compound showed that it contained 14.4% hydrogen atoms and 85.6% carbon atoms by mass. What is its empirical formula?
   a) CH_2
   b) CH
   c) CH_3
   d) C_2H_3
   e) C_2H_5

3. The empirical formula of styrene is CH. An experimental determination of the molar mass of styrene by a student yields the value of 104 g/mol. What is the molecular formula of styrene?
   a) CH
   b) C_5H_{10}
   c) C_3H_8
   d) C_8H_8
   e) C_6H_9

4. When solutions of barium chloride and sodium sulfate are mixed, the spectator ions in the resulting reaction are
   a)   only Ba^{2+}
   b)   only SO_4^{2-}
   c)   only Na^+
   d)   only Cl^-
   e)   both Na^+ and Cl^-

5. What is the net ionic equation for the neutralization of sulfuric acid with potassium hydroxide?
   a) $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$
   b) $2H^+(aq) + 2KOH(aq) \rightarrow 2H_2O(l) + 2K^+(aq)$
   c) $H_2SO_4(aq) + 2KOH(aq) \rightarrow 2H_2O(l) + K_2SO_4(aq)$
   d) $H_2SO_4(aq) + 2OH^-(aq) \rightarrow 2H_2O(l) + SO_4^{2-}(aq)$
   e) $H_2S(aq) + 2KOH(aq) \rightarrow 2H_2O(l) + K_2S(aq)$

6. Which one of the following is <u>necessary</u> in order for a metal to be oxidized?
   a)   addition of hydrogen
   b)   removal of oxygen
   c)   removal of electrons
   d)   addition of electrons
   e)   addition of oxygen

7. The oxidation number of carbon in the formate ion, $HCOO^-$, is
   a)   +2
   b)   −1
   c)   0
   d)   +1
   e)   −2

8. What is the balanced oxidation half-reaction for the following reaction?
    $Cu^{2+}(aq) + Fe(s) \rightarrow Cu(s) + Fe^{2+}(aq)$

    a) $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$
    b) $Fe^{2+}(aq) + 2e^- \rightarrow Fe(s)$
    c) $Fe(s) \rightarrow Fe^{2+}(aq) + 2e^-$
    d) $Cu(s) + 2e^- \rightarrow Cu(s)$
    e) $Cu(s) \rightarrow Cu^{2+}(aq) + 2e^-$

9. Calculate the molarity of a solution that contains 16.1 g of NaOH (40.0 g/mol) in 203 mL of solution.

    a) $0.504 \ M$
    b) $3.17 \times 10^3 \ M$
    c) $0.0817 \ M$
    d) $1.98 \ M$
    e) $8.17 \times 10^4 \ M$

10. $C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$
    How many grams of oxygen are required to burn 4.2 g of C_3H_8 (44 g/mol)?

    a) 3.1 g
    b) 72 g
    c) 36 g
    d) 15 g
    e) 52 g