

AP[®] CHEMISTRY
2011 SCORING GUIDELINES (Form B)

Question 4
(15 points)

(a) Zinc metal is added to a hydrobromic acid solution.

Balanced equation: $\text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$	1 point is earned for the correct reactants. 2 points are earned for the correct products. 1 point is earned for the balanced equation.
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(ii) Write the oxidation half-reaction for the reaction.

$\text{Zn} \rightarrow \text{Zn}^{2+} + 2e^-$	1 point is earned for the balanced half-reaction.
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(b) Solid lithium oxide is added to distilled water.

Balanced equation: $\text{Li}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{Li}^+ + 2\text{OH}^-$	1 point is earned for the correct reactants. 2 points are earned for the correct products. 1 point is earned for the balanced equation.
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(ii) Indicate whether the pH of the resulting solution is less than 7, equal to 7, or greater than 7. Explain.

The pH of the resulting solution would be greater than 7 because OH^- , a strong base, is formed in the reaction.	1 point is earned for the correct answer.
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(c) A 100 mL sample of 1 M strontium chloride solution is mixed with a 100 mL sample of 1 M sodium carbonate solution, resulting in the formation of a precipitate.

Balanced equation: $\text{Sr}^{2+} + \text{CO}_3^{2-} \rightarrow \text{SrCO}_3$	2 points are earned for the correct reactants. 1 point is earned for the correct product. 1 point is earned for the balanced equation.
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(ii) Describe what will occur if the precipitate is dried and a few drops of 1 M hydrochloric acid are added. Explain.

The precipitate disappears and bubbles of CO_2 form.	1 point is earned for a correct answer.
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