

2013 AP[®] CHEMISTRY FREE-RESPONSE QUESTIONS

CHEMISTRY

Part B

Time—40 minutes

NO CALCULATORS MAY BE USED FOR PART B.

Answer Question 4 below. The Section II score weighting for this question is 10 percent.

4. For each of the following three reactions, write a balanced equation for the reaction in part (i) and answer the question about the reaction in part (ii). In part (i), coefficients should be in terms of lowest whole numbers. Assume that solutions are aqueous unless otherwise indicated. Represent substances in solutions as ions if the substances are extensively ionized. Omit formulas for any ions or molecules that are unchanged by the reaction. You may use the empty space at the bottom of the next page for scratch work, but only equations that are written in the answer boxes provided will be scored.

EXAMPLE:

A strip of magnesium metal is added to a solution of silver(I) nitrate.

(i) Balanced equation:



(ii) Which substance is oxidized in the reaction?

Mg is oxidized.

- (a) A 20.0 mL sample of 0.10 M potassium phosphate is added to a 30.0 mL sample of 0.10 M calcium chloride.

(i) Balanced equation:

(ii) How many moles of product are formed?

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(b) Carbon dioxide gas is bubbled into freshly distilled water.

(i) Balanced equation:

(ii) The pH of the solution decreases as the reaction proceeds. Explain.

(c) A piece of zinc metal is placed in a 1.0 *M* solution of hydrochloric acid at 25°C.

(i) Balanced equation:

(ii) When a piece of zinc metal is placed in a 1.0 *M* solution of ethanoic (acetic) acid at 25°C, the rate of reaction is slower than when 1.0 *M* hydrochloric acid at 25°C is used. Explain.

YOU MAY USE THE SPACE BELOW FOR SCRATCH WORK, BUT ONLY EQUATIONS THAT ARE WRITTEN IN THE ANSWER BOXES PROVIDED WILL BE SCORED.