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**Student Activity-**

**Conductivity & Ionization in a Titration**

**Learning Objective TRA-1.A** Identify evidence of chemical and physical changes in matter.

**TRA-1.B** Represent changes in matter with a balanced chemical or net

ionic equation:

**a.** For physical changes.

**b.** For information about the identity of the reactants/products.

**c.** For ions in a given chemical reaction.

**SPQ-4.B** Identify the equivalence point in a titration based on the amounts

of the titrant and analyte, assuming the titration reaction goes to completion.

**SPQ-3.C** Explain the relationship between the solubility of ionic and

molecular compounds in aqueous and nonaqueous solvents, and the intermolecular interactions between particles.

**Science Practices:** **4.A**Explain chemical properties or phenomena (e.g., of atoms or molecules)

using given chemical theories, models, and representations.

**5.E** Determine a balanced chemical equation for a given chemical

phenomenon.

**6.F** Explain the connection between experimental results and chemical

concepts, processes, or theories.

**QUESTION:** What factors can be determined about pH and conductivity of ions during a titration?

Observe the titration of 0.010 M barium hydroxide with 0.010 M sulfuric acid. Universal indicator has been added to the barium hydroxide solution. As the mixture turns from basic to neutral to acidic, the color will change. The *Ksp* of BaSO4 is 1.0×10−10

**1.** Write the total molecular equation for this reaction.

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**2.** Write the net ionic equation for the precipitation of the barium sulfate.

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**3.** Why does the conductivity of the solution decrease and then increase at the end?

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**4.** At what point in the titration does it seem that there is no conductivity? What is the pH at this point?

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**5.** An assumption in interpreting the results of the experiment is that the reaction between the acid and base goes to completion. Justify the validity of this assumption in terms of the equilibrium of BaSO4 .

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**6.** In a different titration, HCl + NaOH NaCl + H2O . This reaction also goes to completion. Justify the validity of this assumption in terms of the equilibrium constant for this reaction.

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