Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **AP Empirical Formula Lab**

Introduction: Like many transition metals, manganese can produce more than one stable ionic charge. Those charges include +2, +3, +4, +5, +6, and +7. Manganese metal will react with excess concentrated hydrochloric acid until it is fully reacted. The purpose is to determine the formula of the ionic compound formed between manganese and the acid, and thus, which ion of manganese has formed.

Materials: Manganese metal, balance, excess 12M hydrochloric acid, dish, Bunsen burner.

Pre-Lab Questions:

1. As the reaction proceeds, do you expect the mass of the product to be larger, smaller, or the same as than the mass of the original Manganese metal? Explain your choice.
2. Which element in hydrochloric acid do you expect the manganese to react with to form an ionic compound? Explain your answer.

Procedure: A known mass of manganese metal will react with excess concentrated Hydrochloric acid. Once the reaction is complete, the flask will be evaporated to dryness, leaving a pink powder inside the flask. <https://youtu.be/_4NYBcNIHrw>

| **Lab Data** | |
| --- | --- |
| Mass of Empty Flask |  |
| Mass of Manganese |  |
| Mass of Flask and Product |  |

Post lab Questions:

1. Based on the experimental data, what is the empirical formula of the manganese product? Show all work.
2. Write the balanced chemical equation for the reaction of manganese and hydrochloric acid. Include state symbols.
3. Draw a models to explain the change of mass that occurred during his reaction.
4. What additional step in the procedure could be done to ensure all of the manganese has reacted?