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**Student Activity- Sodium in Water**

**Learning Objective TRA-1.A** Identify evidence of chemical and physical changes in matter. **SPQ-2.A** Explain the quantitative relationship between the elemental composition by mass and the empirical formula of a pure substance.

**Science Practices: 6.A:**  Make a scientific claim. **5.E** Determine a balanced chemical equation for a given chemical phenomenon. **6.E** Provide reasoning to justify a claim using connections between particulate and macroscopic scales or levels. **5.F** Calculate, estimate, or predict an unknown quantity from known quantities by selecting and following a logical computational pathway and attending to precision (e.g., performing dimensional analysis and attending to significant figures).

Sodium is a shiny soft metal with some interesting chemical properties. Observe what happens when sodium in placed in water that contains phenolphthalein indicator.

1. Write down at least five observations about what you saw in this demo, including a description of the sodium itself.

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2. Give three proofs that demonstrate a chemical reaction occurred.

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3. One of the products of this demonstration was sodium hydroxide (an ionic solid). What happened to it?

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4. Balance the reaction below that shows the reaction of sodium and water.

**\_\_\_Na(s) + \_\_\_H2O(l) \_\_\_NaOH(aq) + \_\_\_H2(g)**

5. Why did the water turn pink?

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6. What happened to the water molecules when they reacted with the sodium?

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7. Was this reaction exothermic or endothermic? How do you know?

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8. The fire we saw in this demo was caused by the burning of the hydrogen gas produced. Write out the reaction for the combustion of hydrogen gas.

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9. If the sodium hydroxide was recovered from the water using distillation, we could determine its purity by analyzing its % by mass of each element. Use mathematics to prove the formula for sodium hydroxide based on the following percentages of elements:

 57.48 % sodium

 40.00% oxygen

 2.52% hydrogen