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**Student Activity- Ideal Gas Law**

**Learning Objective SAP-7.A** Explain the relationship between the macroscopic properties of a sample of gas or mixture of gases using the ideal gas law.

**Science Practice** **5.A** Identify quantities needed to solve a problem from given information (e.g., text, mathematical expressions, graphs, or tables).

Observe the demonstration of what happens when water is added to a small sample of solid calcium carbide, CaC2 (s), which is placed in a large coffee and sealed with a lid. Write down your observations. Explain what is happening in the reaction and solve the problems.

**Observations**

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1. Calcium carbide reacts with water to produce calcium hydroxide and acetylene (C2H2). Write down and balance this reaction.

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2. What type of reaction is this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Acetylene combusts in oxygen to form carbon dioxide and water. Write down and balance this reaction.

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4. Assuming that the pressure of the room is approximately 1.00 atm and that the temperature of the room is approximately 25.0 oC, use the ideal gas law, PV=nRT, to calculate the moles of air in the 3.05 L coffee can. (R = 0.08206 L.atm/mol.K)

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5. Air is approximately 21.0% oxygen. Calculate the moles of the O2 in the coffee can.

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6. Using stoichiometry, calculate the moles of acetylene required to react with all of the oxygen in the coffee can.

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7. Using stoichiometry, calculate the moles of calcium carbide required to produce the acetylene from the above problem.

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8. Convert moles of calcium carbide into grams of calcium carbide. This is how many grams of calcium carbide were needed to make this reaction work.

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9. What would happen if we tried the same experiment using triple the amount of calcium carbide in the same container under the same conditions? Explain.

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