Worksheet #7

Name: **Period:**   **Seat#:**

Victim Data

- Tony DeMoy
- 45 years old
- Organic Chemist and Researcher
- Severe osteoarthritis

Synopsis

- Several signs around the death site that suggest foul play
- Wife has a proven alibi
- Four possible causes of his untimely death suggested by his wife

Autopsy Results

There were high levels of the compound _____ found during the autopsy.
(You will gain access to the name of the compound when you show your calculations in the following sections)

Task

Identify who and what killed Tony DeMoy.

Crime Scene Evidence

1. DeMoy's latest and most brilliant research was on a specific type of aromatic hydrocarbon. DeMoy, being a paranoid individual, wouldn't specify which one, but a 453.28 g sample was shown to contain only carbon and hydrogen. Hydrogen contributed 7.76% of the total mass and the molar mass was determined to be ~78.12 g/mol. DeMoy's laboratory had a carefully regulated ventilation system to prevent high level inhalation of toxic fumes in the lab. DeMoy periodically mentioned to his wife that he suspected his lab partner, Kasey Hatterson, was altering the flow rates of the system. Curiously, without DeMoy, the published research could mean thousands of dollars for Hatterson. With money as motive, could this solve the mystery?

2. Several of DeMoy's full or partial fingerprints were retrieved from a tipped cup found near the crime scene. A faint almond scent was detected around the rim. A liquid sample of 823.15g of the compound was found to contain 3.74% H, 44.43% C, and 51.83% N. The molar mass was determined to be ~27.03 g/mol. A friend of DeMoy's noticed a disgruntled neighbor, Shay Lemarck, uncharacteristically eager to provide refills of the compound for analysis. Could this be the answer?

3. An unlabeled prescription drug bottle was found in the medicine cabinet of DeMoy's bathroom. A 532.99 g sample of the drug was analyzed and found to contain 346.12g C, 23.98g H, 108.52g O, and 54.36g S. The molar mass of the compound was found to be 314.38 g/mol. It may be a drug prescribed for DeMoy's osteoarthritis. Prolonged ingestion of this drug is thought to lead to heart attack. DeMoy's doctor, Finley Finch has a quiet reputation of prescribing dangerous drugs to "dispose of" unwanted patients. Lately, DeMoy has been gaining more recognition in the community due to his latest research on aromatic hydrocarbons. Could Finch's jealousy be the cause of Tony DeMoy's death?

4. DeMoy's wife mentioned that the osteoarthritis had become so debilitating as of late that he was "popping painkillers like candy". Certain painkillers are even more dangerous in large quantities than others. One indication that this may be the cause of death was a partially full painkiller bottle found on the scene. Chemical analysis of one pill (1454.10 g) revealed 924.08 g C, 87.39 g H, 134.80 g N, and 307.83 g O. The molar mass of the drug is known to be 151.18 g/mol. Could it be that the crime scene is not a crime scene at all?

Procedure

Calculate the empirical formula (EF) and molecular formula (MF) for each substance described in each scenario. Use this information to identify the name of each molecules name (Molec. Name). Then submit your results in order to gain access to DeMoy's autopsy report. Once you find out which chemical was found in DeMoy's blood, use the CSI Chemical Compound Table and figure out where it came from and who is responsible for DeMoy's death. Provide a short description of what this compound is and what it is used for.

Calculations

Using your knowledge of empirical formulas, calculate the empirical formula for each of the suspected causes of death outlined in the Crime Scene Evidence. Show all work in order to have your findings hold up in court during the trial.

1. Suspect: *Kasey Hatterson* EF: _____ MF: _____ Molec. Name: _____

2. Suspect: *Shay Lemarck* EF: _____ MF: _____ Molec. Name: _____

3. Suspect: *Finley Finch*   EF: _____ MF: _____ Molec. Name: _____

4. Suspect: *Tony DeMoy*   EF: _____ MF: _____ Molec. Name: _____

Conclusion
During the autopsy, Tony DeMoy was found to have high levels of _____ in his system. This

compound is commonly used for _____. Based on this information we determined that

_____ was the one who murdered Tony DeMoy because (explain the motive):