1A. The action of bacteria on meat and fish produces a compound called “cadaverine”. As its name and origin imply, it doesn’t have a pleasant odor! (It is also in bad breath and contributes to the odor of urine.) It is 58.77 % C, 13.81% H, and 27.40 % N. Its molar mass is 102.2 g/mol. Determine the molecular formula of cadaverine.

1B. How many moles of nitrogen are found in a 0.550 mg sample of cadaverine?

2. If “Epsom salt”, MgSO₄·xH₂O, is heated to 250°C, all the water of hydration is lost. On heating a 1.687 g sample of the hydrate, 0.824 g of MgSO₄ remains. How many molecules of water occur per formula unit of MgSO₄. Write the complete formula of the hydrate and state the complete name.
3. Lysine is an amino acid that has the following elemental composition: C, H, O, N. In one experiment, 2.175 g of lysine was combusted to produce 3.94 g of CO₂ and 1.89 g H₂O. In a separate experiment, 1.873 g of lysine was burned to produce 0.436 g of NH₃. The molar mass of lysine is approximately 150 g/mol. Determine the empirical and molecular formula of lysine.

4. A particular brand of beef jerky contains 0.0552 % sodium nitrite (NaNO₂) by mass and is sold in an 8 oz (1 oz = 28.35 g) bag. What mass of sodium does the sodium nitrite contribute to the bag of beef jerky?

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% \text{ NaNO}_2 = \frac{\text{mass of NaNO}_2}{\text{mass of sample}} \times 100\%
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While completing your research on the speciation of clover in Sacramento County, you isolate an acid from clover leaves. You discover that it contains only the elements C, H, and O. The apparatus pictured below is used for the analysis of 0.513 g of the compound. Before the experiment, the MgSO₄ has a mass of 56.784 g. After the experiment, the MgSO₄ has become hydrated to a mass of 56.887 g. Similarly, the mass of the NaOH has increased to 34.302 g from 33.801 g. Another experiment has shown that the molar mass of the acid is about 90 g/mol. What is the molecular formula of the acid?