HIGH SCHOOL CHEMISTRY IN A BIOLOGICAL CONTEXT:
The chemistry of Nora’s medulla creates the need to understand
Avogadro’s number and molar relationships.

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PLAN

Setting
- High school chemistry class in suburban Atlanta, Georgia, USA
- Ten to 28 students per class
- Fifty-five minute class periods
- Students are approximately 16-17 years old

Goal
Our goal was to make learning about Avogadro’s number and molar concepts engaging and exciting.

Objectives
When setting out to write this case, we hoped to write a case that would meet the following objectives:
1. Define Mole.
2. Calculate the number of moles when starting with a given number of molecules or a given mass.
3. Calculate the mass of a given number of moles of a substance.
4. Use the chemical formula to calculate the molecular mass of a substance.

IMPLEMENTATION

Case Narrative Highlights
Nora lay on the stretcher, blue tipped and silent. How could this situation have gotten so out of control?

Earlier that day...
Nora held up a baggie of white powder and shimmering specs. “Ooh! I can’t wait to get to the party tonight!”

Early at the party...
How do you know how much to take, Nora? Asks Jayson. I’ll just take about the same as last time...about half a gram.” Nora replied as she prepared the syringes.

Late at the party...
The paramedic shouts, “I can’t believe you forgot the chart! How do we know how much naloxone she needs without the dosing chart?”

Learning Issue Examples
- What causes blue lips?
- Why do we breathe?
- What is hypothermia?
- How can drugs stop your breathing?
- How do drugs kill you?
- What drugs are white?
- What are the shimmering specs?
- What’s a medulla oblongata?
- What are the shimmering specs?
- Why are some drugs injected and others smoked?
- Can heroin cause you to stop breathing?
- Who are the shimmering specs?
- What is heroin?
- Can heroin cause you to stop breathing?
- What are the shimmering specs?
- Why are some drugs injected and others smoked?
- What is heroin?
- Can heroin cause you to stop breathing?
- Who are the shimmering specs?
- What is heroin?
- Can heroin cause you to stop breathing?

Assessment: Build A Pharmacologically Active Molecule
Students worked in pairs to build a molecule of choice using only materials they had requested in molar quantities.

OUTCOME

Actual Objectives Met

Additional Objectives:
1. Discuss chemical properties of drugs and how such properties affect drug administration and activity
2. Describe applications of chemistry in medicine and modern industry such as pharmaceutical development
3. Describe and diagram the anatomy of the respiratory system
4. Define hemoglobin and cyanosis
5. Define neurotransmitter, receptor, synapse, brainstem, medulla oblongata, agonist and antagonist
6. Define the major classes of abused drugs and give examples of each
7. Discuss peer relationships and responsibilities in difficult situations

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References
- Covalent Bonds
- The Mole
- States of matter: Crystals
- Substituted Hydrocarbons

Chapters
7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79