The Strange Case of Mole Airlines Flight 10^{23}

Name _____ **Date** _____

Scene of the Crash

At 6:02 a.m. you and your team of medical examiners are called to the scene of a plane crash. You find evidence of a pre-crash explosion. At the site of the explosion a material has been found. Subsequent chemical analysis of the material shows it was:

C 37.01% H 2.22% N 18.5% O 42.27%

The mangled passengers are found in and around the crash. They must be identified by the substances found in their belongings or in their bodies, since they are not recognizable and their dental records are not available. Upon further investigation one passenger was suspected of having been murdered before the crash - the time of death was approximated at one hour prior to the crash.

Your Job

1) Use the percent composition data in Table 3 to determine formulas for the compounds found with or in the passengers. Match these formulas with the identity of each compound listed in Table 1.
2) Use the personal data in Table 2 to make a probable identification of each passenger.
   - ❑ Record the identifications on the Victim Identification Form.
   - ❑ Include the evidence that supports your identification. The solution to the mystery is the one that the evidence points to by logical deduction. Do not insert ideas not supported by the evidence.
   - ❑ Determine who was murdered.
   - ❑ Determine who is most likely to have committed the murder.
   - ❑ Determine the identity of the substance that was found at the site of the explosion.

Table 1: Possible Compounds

Identity	Formula	Notes
Acetaminophen	$C_8H_9NO_2$	Pain killer (Tylenol)
Aspartame	$C_{14}H_{18}N_2O_5$	Artificial sweetener
Aspirin	$C_9H_8O_4$	Pain killer
Cocaine	$C_{17}H_{21}NO_4$	Narcotic, illegal
Codeine	$C_{18}H_{21}NO_3$	Pain killer, prescription controlled
Curare	$C_{40}H_{44}N_4O$	Poison
Dimetacrine	$C_{10}H_{13}N^*$	Prescription drug, antidepressant
Nitroglycerine	$C_3H_5N_3O_9$	Explosive, heart medication
Strychnine	$C_{21}H_{22}N_2O_2$	Rat poison
Thiobromine	$C_7H_8N_4O_2$	Chocolate (flavoring)
Trinitrotoluene	$C_7H_5N_3O_6$	Explosive (TNT-dynamite)
Vanilla	$C_8H_8O_3$	Flavoring

***the empirical formula rather than the actual formula is used.**

Table 2: Personal Data

Passengers & Crew	Notes
Norm Anderson	Suspected leader of a terrorist organization
Bob Henderson	Professional athlete, just suspended for drug violations
Bill Jackson	Suspected drug dealer
Lisa Johnson	Environmental engineer, severely depressed
Jim LeClaire	Baker
Connie Majors	Pharmacist
Amadeo Oldere	Has a heart condition
Archie Starr	Teacher, addicted to sugar free drinks

Table 3: Percent Composition Data of the Compounds Found in or with the Bodies						
Passenger or Crew	Compound Analysis (%)				Location	Empirical Formula & Name
	C	H	N	O		
1	67.31	6.98	4.62	21.10	Blood	
2	63.15	5.30	--	31.55	Face	
	46.66	4.48	31.1	17.76	Stomach	
3	72.15	7.08	4.68	16.03	Pockets (2000 tablets)	
4	15.87	2.22	18.15	63.41	Blood and pockets	
5	75.42	6.63	8.38	9.57	Blood	
	37.01	2.22	18.5	42.27	Pockets	
6	57.14	6.16	9.52	27.18	Pockets	
7	80.48	7.45	9.39	2.68	Pockets	
	81.58	8.90	9.52	--	Pockets	
8	60.00	4.48	--	35.53	Pocket	
	63.56	6.00	9.27	21.17	Pocket	

Victim Identification Form		
Passenger	Most Probable Identity (Name)	Evidence that Supports Identification
1		
2		
3		
4		
5		
6		
7		
8		

_____was murdered by _____

Identity of Substance at the site of the explosion: _____

Certified by _____ Date _____

Source: *The Journal of Chemical Education*, April 2003. Volume 80, No. 4.