

### The Strange Case of Mole Airlines Flight 1023

You and your CSI team are called to the scene of a plane crash. The plane shows evidence of a pre-crash explosion. The site of the explosion has a compound with the following analysis: 37.01% carbon, 2.22% hydrogen, 18.5% nitrogen, and 42.27% oxygen. The victims are found in around the crash and must be identified by the substance found in their belongings or in their bodies since dental records are not available. Further evidence reveals that one person was murdered with the time of death established as one hour before the crash.

Your job is to:

- Use the percent composition data to determine the empirical formulas and identities for the compounds found at the crash site. (You must show all work on separate paper and turn it in with your final answers. You also must go from percent composition data to empirical formulas, not empirical formulas to percent composition data).
- Use personal data to make a probable identification of each victim.
- Determine who was murdered and who is the most probable murder.

VICTIM #	ANALYSIS OF COMPOUND				WHERE FOUND
	% C	% H	% N	% O	
1.	67.31	6.96	4.62	21.10	blood & luggage
2.	63.15	5.30		31.55	briefcase (a)
	46.66	4.48	31.1	17.76	stomach (b)
3.	71.88	7.08	4.68	16.03	pockets
4.	15.87	2.20	18.15	63.10	blood & pockets
5.	75.42	6.63	8.38	9.57	blood (a)
	37.01	2.22	18.5	42.27	luggage (b)
6.	57.14	6.16	9.52	27.18	stomach
7.	80.42	7.40	9.39	2.68	briefcase (a)
	81.58	8.90	9.52		luggage (b)
8.	60.00	4.48		35.53	pocket & briefcase(a)
	63.56	6.00	9.27	21.17	pocket & briefcase(b)
	75.42	6.63	8.38	9.57	Briefcase (c)

Use the table below to identify each of the compounds described above.

POSSIBLE COMPOUNDS		
NAME	FORMULA	NOTES
codeine	$C_{18}H_{21}NO_3$	painkiller, prescription, controlled
cocaine	$C_{17}H_{21}NO_4$	narcotic, illegal
aspirin	$C_9H_8O_4$	pain killer
vanilla	$C_8H_8O_3$	flavoring
trinitrotoluene	$C_7H_5N_3O_6$	explosive
nitroglycerine	$C_3H_5N_3O_9$	explosive, heart medication
curare	$C_{40}H_{44}N_4O$	poison
thiobromine	$C_7H_8N_4O_2$	chocolate (flavoring)
strychnine	$C_{21}H_{22}N_2O_2$	rat poison
dimetacrine	$C_{10}H_{13}N$	antidepressant, prescription
acetaminophen	$C_8H_9NO_2$	pain killer (Tylenol)
aspartame	$C_{14}H_{18}N_2O_5$	artificial sweetener (NutraSweet)

### The Flight List of Passengers and Crew:

Amadeo Aviator - the pilot, has a heart condition

Curie Drugs – sales representative of a pharmaceutical company

Kelvin Doughnut – baker, specializes in pastries shaped like orbitals

Bohr Diet – a chemistry teacher “addicted” to sugar free drinks

Democritus “D” Victory - pro athlete suspended for drug violations

Ruthy Ford-recycle - environmental engineer, severely depressed due to canceled project

Dalton Molar – high school student who recently had dental surgery

Norm Einstein - suspected leader of a terrorist organization

Remember - you must show all work on separate paper and staple it to this page when you turn it in. Also remember that you must calculate from percent composition data to empirical formulas **NOT** empirical formulas to percent composition data.

VICTIM #	NAME OF SUBSTANCE FOUND	VICTIM'S NAME
1.		
2.	a. b.	
3.		
4.		
5.	a. b.	
6.		
7.	a. b.	
8.	a. b. c.	

1. What was the chemical at the crash site?

2. Who was the murderer?

3. Who was the murder victim?

4. Who blew up the plane?