

# Chem 2100, "Organic Chemistry I" WS07, Dr. Rainer Glaser

## Quiz #1

"The Element Carbon: Allotropes, Isotopes & Lewis Structures."

Wednesday, 2-7-2007, 9:20-9:50 am

Name:

*Answer Key*

Question 1. Atoms and Isotopes.	10	
Question 2. Carbon Allotropes.	10	
Question 3. Types of Formulas	10	
Question 4. Lewis-Kekule Structures I	10	
Question 5. Lewis-Kekule Structures II	10	
<b>Total</b>	<b>50</b>	

**Question 1. Atoms and Isotopes.** (10 points)

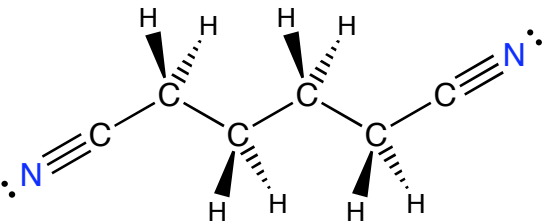
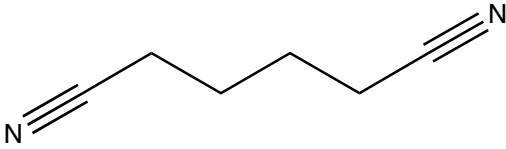
Number of electrons of neutral carbon atom:	6
Number of core electrons of fluorine atom:	2
Main quantum number of a chlorine valence electron:	3
Number of node spheres in a 3s atomic orbital:	2
Number of node spheres in a 3p atomic orbital:	1
Electronegativity of oxygen:	3.5 ( $\pm 0.1$ )
Approximate value of the electronegativity of sulfur:	2.5 ( $\pm 0.2$ )
Natural abundance of $^{13}\text{C}$ in percent:	1.1 ( $\pm 0.5$ )
Number of neutrons in $^{14}\text{C}$ :	8
Half-life of the decay of $^{14}\text{C} \rightarrow ^{14}\text{N} + \beta$ in years:	5700 ( $\pm 250$ )

**Question 2. Carbon Allotropes.** (10 points)

In each box write "Yes" or "No". Minus 0.5 points for every false answer, no negative Q-score.

	Diamond	Graphite	Buckyball	Nanotube
Contains $\text{sp}^3$ -hybridized carbon	Yes	No	No	No
Contains double bonds	No	Yes	Yes	Yes
Contains six-membered rings	Yes	Yes	Yes	Yes
Contains planar six-membered rings	No	Yes	No	No

**Question 3. Types of Formulas.** (10 points)

	Molecular Formula: $\text{C}_6\text{H}_8\text{N}_2$
	Empirical Formula: $\text{C}_3\text{H}_4\text{N}$
Line Drawing Formula: 	Condensed Structural Formula: $\text{NC-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-CN}$ or $\text{NC-(CH}_2\text{)}_4\text{-CN}$

