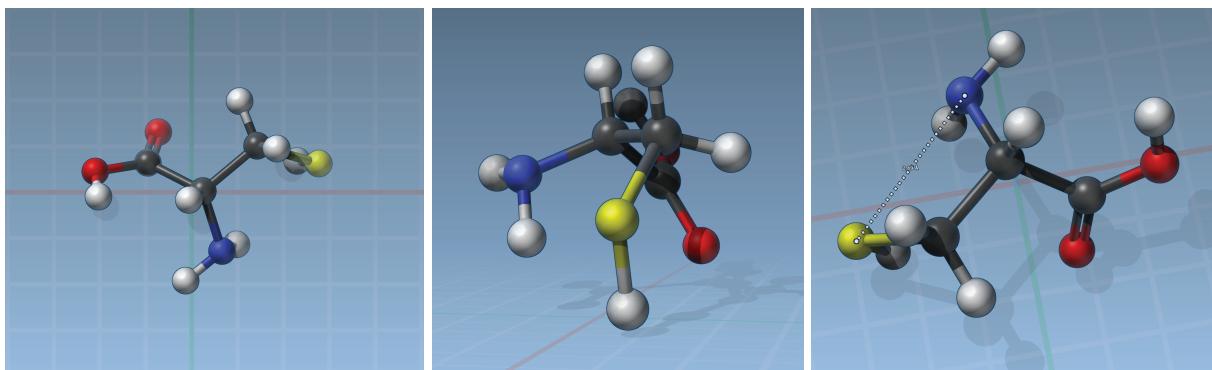


# Y1-W4 Practice Quiz

Name and chemistry block: \_\_\_\_\_

There is a total of 20 points. Time suggestion is **30** min. Use your textbook, notes, Data Booklets, calculator, computer... just do it yourself without the help of other people or trying to locate the answers. You can always use diagrams to help illustrate your answer.

1. Cysteine is an amino acid, essential for making proteins in organisms. Its structure is shown from three perspectives below.



**Figure 1** Cysteine in 3D.

- [2] (a) Deduce the **full structural formula** of cysteine.

- [1] (b) Deduce the **molecular formula** of cysteine.

(b) \_\_\_\_\_

- [2] (c) Calculate the **molar mass** of cysteine.

(c) \_\_\_\_\_

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(d) The distance between the blue and yellow elements was measured to be 2.89 Å.

- [2] i. Express this distance in **pm**. Show your calculations.

i. \_\_\_\_\_

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- [2] ii. Express this distance in **µm**. Show your calculations.

ii. \_\_\_\_\_

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- [2] (e) Cysteine absorbs light of 250 nm. Suggest the color that would be observed when cysteine is dissolved in water.

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2. Neon (Ne) has three stable isotopes. Wikipedia shows their distribution as follows.

Isotope		Decay		
	abundance	half-life ( $t_{1/2}$ )	mode	product
${}^{20}\text{Ne}$	90.48%	stable		
${}^{21}\text{Ne}$	0.27%	stable		
${}^{22}\text{Ne}$	9.25%	stable		

**Standard atomic weight** 20.1797(6)<sup>[1]</sup>  
 $A_r$ , standard(Ne)

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**Figure 2** Neon Wikipedia ChemBox.

- [2] (a) Deduce the number of protons, neutrons, and electrons present in  ${}^{20}\text{Ne}^+$ .

(a) \_\_\_\_\_

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- [2] (b) Show how the atomic mass of neon can be calculated.

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- [3] (c) Calculate the volume of a neon atom. Give your answer in  $m^3$  and to three significant figures. Show your work for intermediate credits.

(c) \_\_\_\_\_

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- [3] (d) Calculate the number of neon atoms in a 1.000 g sample. Give your answer to 4 significant figures.

(d) \_\_\_\_\_

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