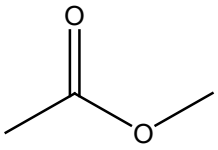
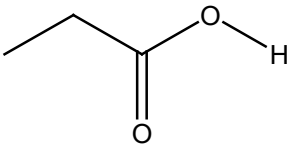
Diploma of Health Sciences
Diploma of Science
SLE155 Chemistry for the Professional Sciences

Question 1 **[1 + 1 = 2 marks]**

a) Examine the pair of molecules below and indicate if they are identical, isomers, or unrelated.



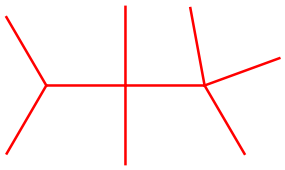


identical / **isomers** / unrelated

1 mark, all or nothing

b) Draw the line structure that corresponds to the following condensed structure:

$CH_3CH(CH_3)C(CH_3)_2C(CH_3)_3$

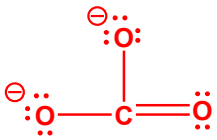


1 mark, all or nothing

Question 2 **[2 marks]**

Write the Lewis structure for the following molecule:
Include all non-zero formal charges where appropriate. If resonance structures exist, you only have to draw one structure.

CO_3^{2-}



Only one resonance structure is required
1 mark bonds and ½ mark all lone pairs
½ mark correct formal charge on correct atoms

Question 3 **[1 mark]**

Which is the shorter bond length, C = C or C ≡ C? Explain the factors that influenced your choice.

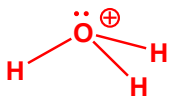
C ≡ C < C = C **½ mark**

There are 6 electrons being shared in a triple bond whereas there are only 4 electrons being shared in a double bond **½ mark**

Question 4 **[2 marks]**

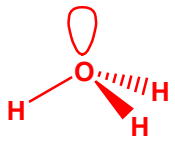
a. Give the Lewis structure for the hydronium ion, H_3O^+.
b. Draw and name the molecular shape of the **molecule** (how the atoms are arranged).
c. Indicate if the molecule overall is polar or non-polar.

a. Lewis structure drawing



1 mark all or nothing.
Lone pair and +ve formal charge must be included.

b. Drawing and name of shape of molecule



Trigonal pyramid

½ mark drawing (they do not need to show lone pair as a balloon) and name of shape.

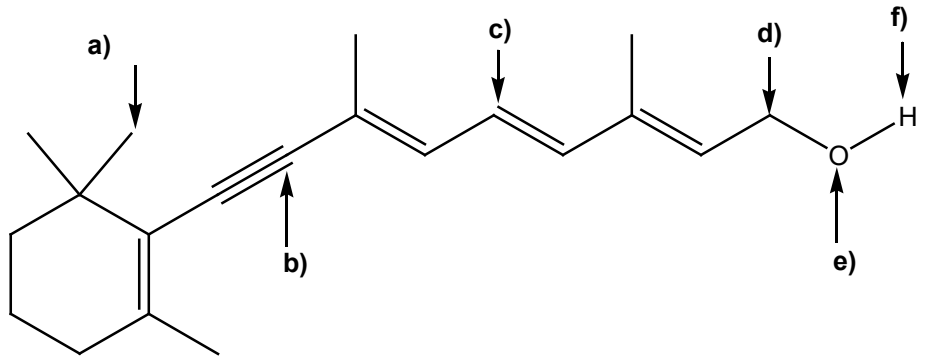
c. Polar or non-polar?

Polar **½ mark**

Question 5 **[3 marks]**

Determine the type of orbitals (atomic, sp^3, sp^2, or sp) used by <u>each</u> atom indicated in the molecule shown below.

½ mark each, all or nothing



Atom a)…**sp^3**…….

Atom b)… **sp** …….

Atom c)…**sp^2**…….

Atom d) …**sp^3**…….

Atom e) …**sp^3** …….

Atom f) …**atomic** …….

Selected Elements and Atomic Masses/u