Final Examination in General and Organic Chemistry
Common Core – L1 SNV

1- Balance the following chemical equations **2 pts**

وازن المعادلة الاتية

$Al_2O_3 + COCl_2 \rightarrow CO_2 + AlCl_3$

2- Calculate the speed of an electron after it has been accelerated from rest through a potential difference of 10000 V. **4 pts**

احسب سرعة الالكترون المسرع من السكون بواسطة فرق كمون مقداره فولط 10000

The mass of an electron = 9.11×10^{-31} kg. e = 1.60×10^{-19} C.

3- Find the molecular formula of a compound containing 68.4% Cr and 31.6% Oxygen (weight percentages). **2 pts**

أوجد الصيغة الجزيئية لمركّب يحتوي على 68.4٪ من الكروم (Cr) و31.6٪ من الأكسجين (O) كنِسَب مئوية وزنية.

M_{Cr} = 52 g/mol M_O = 16 g/mol

4- Complete the following table **(12 pts)**

اكمل الجدول الاتي

Formula الصيغة	Topologic formula الصيغة الطوبولوجية	Number of functions عدد الوظائف	Type of functions نوع الوظائف	Name الاسم
				3-amino-2-oxobutanal
				4-éthyl-2-méthylhexane.
CH2=CH- CH =CH - CH3				
				3-méthylocta-1,2-diène-4-yne

				Pent-3-yn-2-ol.
				N,2-diéthylbutan-1-amine

Solution

1- $Al_2O_3 + 3COCl_2 \rightarrow 2\ CO_2 + 3\ AlCl_3$.....2 pts

2- Here we need to find the velocity of travelling electrons using the given stopping potential.

We know that

$E_C = 1/2mv^2$…….0.75pts

$E_C = F_e * d$ …….0.75pts

$F_e = e*U/d$…….0.75pts

$E_C = e*U$ …….0. 5pts

$e*U = 1/2mv^2$ ……0. 5pts

$v^2 = 2eU/m \Rightarrow v = \sqrt{2eU/m}$ ……0.25pts

The charge(e) and mass(m) of electron are also given as, $e = 1.602 * 10^{-19}$ and $m = 9.11 * 10^{-31}$ Kg

Now substituting the values of e, m, U.

$v = \sqrt{2} \times (1.602 \times 10^{-19}) \times 10000/9.11 \times 10^{-31}$ ……0.25pts

$v = 1.87 \times 10^6\ m/s$……0.25 pts

3-

Convert percentages to grams

Assume we have 100 g of the compound. This means we have 68.4 g of chromium (Cr) and 31.6 g of oxygen (O).

Convert grams to moles

To convert grams to moles, divide by the atomic mass of each element. The atomic mass of Cr is 52.00 g/mol, and the atomic mass of O is 16.00 g/mol.

Moles of Cr = = 1.315 ……0. 25pts

Moles of O = 1.975 ……0. 25pts

Find the simplest molar ratio

Divide each mole value by the smallest mole value to find the simplest ratio.

Ratio of Cr = 1……0. 25pts

Ratio of O = 1.502……0. 25pts

Convert to whole numbers

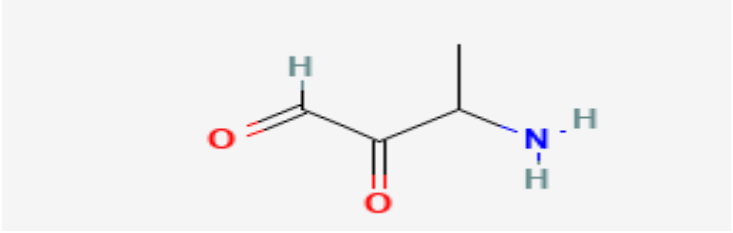
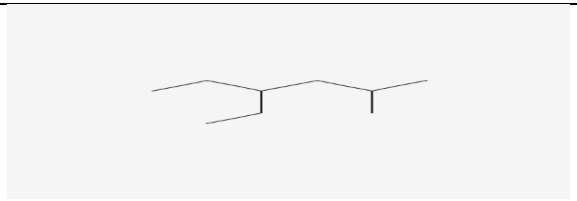
Since we need whole numbers for the empirical formula, multiply both ratios by 2.

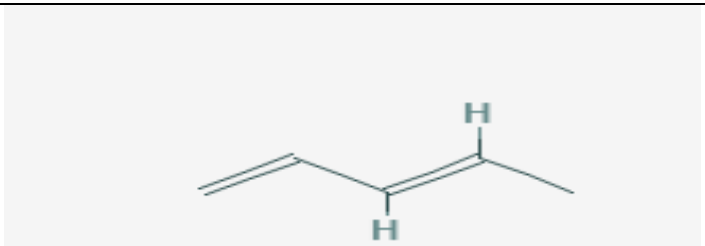
Cr : 2……0. 25pts

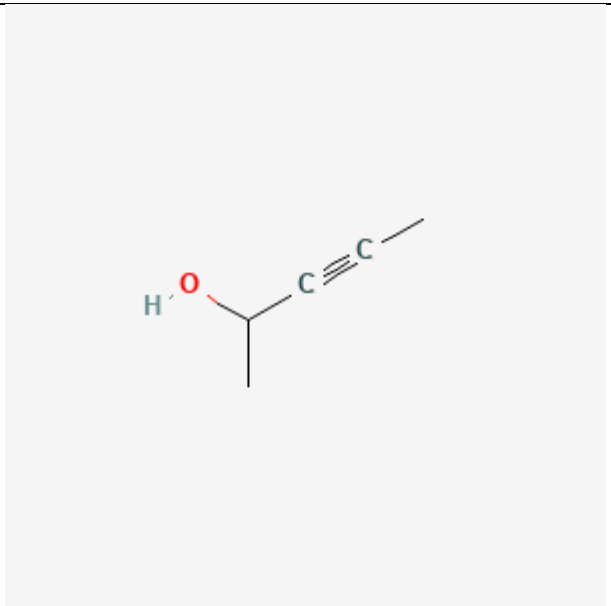
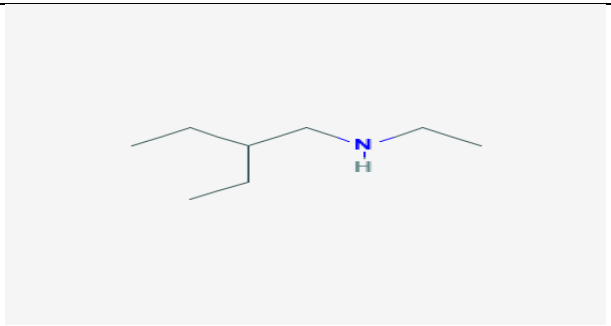
O : 3……0. 25pts

The empirical formula is Cr_2O_3.……0. 5pts

4- Each cell of the table is worth 0.5 points

Formula الصيغة	Topologic formula الصيغة الطوبولوجية	Number of functions عدد الوظائف	Type of functions نوع الوظائف	Name الاسم
$C_4H_7NO_2$		3	Aldéhyde Cétone Amine	3-amino-2-oxobutanal
C_9H_{20}		0		4-éthyl-2-méthylhexane.

CH_2=CH- CH =CH -CH_3		0		penta-1,3-diène
$CH_2=C=C(CH_3)-C\equiv C-CH_2-CH_2-CH_3$		0		3-méthylocta-1,2-diène-4-yne

C_5H_8O		1	Alcool	Pent-3-yn-2-ol.
$C_8H_{19}N$		1	Amine	N,2-diéthylbutan-1-amine