2025 CCO Answer Sheet

Name_____School_____

Account Number_____

1. MOLECULAR ORBITALS AND IONIZATION ENERGIES

a) ***2 marks***

b) ***4 marks***

C	CO	O

c) ***4 marks***

	Approximate Ionization Energy (eV)	Bond Order	P for paramagnetic D for diamagnetic
C	11.3	N/A	
O		N/A	
CO			
$^{\bullet}CO^{-}$			
$^{\bullet}CO^{+}$			

d) ***2 marks***

2. SEMICONDUCTORS and QUANTUM DOTS

a) ***4 marks***

Calculations for carbon quantum dots:

E(R) for carbon QDs _____ (eV)

Calculations for carbon quantum dots:

E(R) for silicon QDs _____ (eV)

b) ***2 marks***

☐ **A.** ☐ **B.** ☐ **C.** ☐ **D.** ☐ **E.**

c) ***4 marks***

Quantum yield (quantum dots) _____ %

d) ***2 marks***

Orbital Diagram:

3. ANALYTICAL CHEMISTRY

a) ***3 marks***

A.

B.

C.

D.

E.

F.

G.

H.

b) ***3 marks***

Formation of **B:**

Formation of **D:**

Formation of **E:**

Formation of **F:**

Formation of **G:**

Reaction of **G** with SO_2 to produce **H**：

c) ***6 marks***

A.	B.
C.	D.
E.	F.
G.	

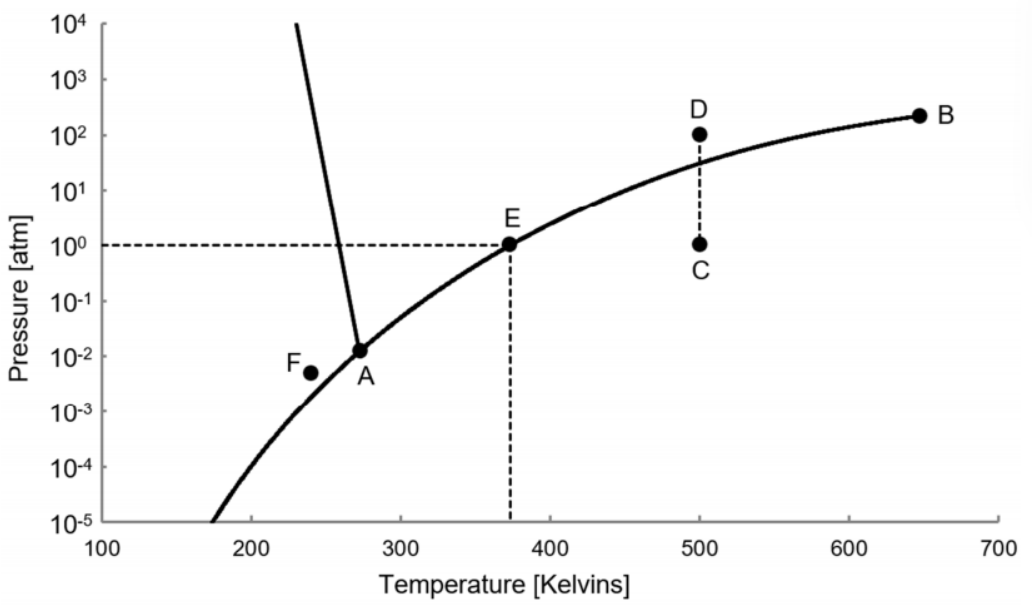
4. PHYSICAL CHEMISTRY

a) ***1 mark***

b) ***1.5 marks***

c) ***1 mark***

d) ***1.5 marks***



e) ***1 mark***

○ **A** ○ **B** ○ **C** ○ **D** ○ **E**

f) ***1 mark***

g) ***1 mark***

○ On the dotted line between point E and the temperature axis.

○ On the curve between point E and D.

○ On the dotted line between point C and D.

○ On the curve between point A and E.

○ On the curve above point A.

h) ***2 marks***

i) ***1 mark***

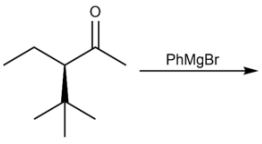
j) ***1 mark***

5. ORGANIC CHEMISTRY

a) ***1 mark***

b) ***1 mark***

c) ***1 mark***



d) ***2 marks***

e) ***2 marks***

f) ***3 marks***

C.	D.
E.	F.
G.	H.

g) ***2 marks***

Infrared Data

Compound	IR frequencies	Structure of functional group
A	3471 cm^{-1}	
A	1736 cm^{-1}	
C	1746 cm^{-1}	
G	1664 cm^{-1}	

Mass Spectrometry Data

Compound	m/z (% base)	Give formula of fragment, include charge
H	65(73%)	
C	77(49%)	
G	85 (16%)	
A	91 (100%)	
H	105 (100%)	
A	173 (12%)	