QUESTION 1

For the following reactions indicated as 1, 2 and 3, which is the correct order of INCREASING rate of electrophilic aromatic substitution?

1. This is DONATING group due to the resonance effect of the non-bonding electrons (the inductive effect of the C=O bond is very small), so is ACTIVATING, and increases the reaction rate.

2. This is a withdrawing group on a π-system, thus DEACTIVATING, and decreases the rate of the reaction.

3. This is DONATING group, but a weaker donating group than in reaction 1 due to the proximity of the polarized C=O bond, still ACTIVATING, but increases the reaction rate less than in 1.

A 1 (slowest) < 2 < 3 (fastest)
B 2 (slowest) < 3 < 1 (fastest)
C 1 (slowest) < 3 < 2 (fastest)
D 3 (slowest) < 2 < 1 (fastest)
QUESTION 2

Which best describes the product of the following reaction sequence?

1. PCC
2. MeMgBr
3. $\text{H}_3\text{O}^+$
4. $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4$

A. \[ \text{ } \]
B. \[ \text{ } \]
C. \[ \text{ } \]
D. \[ \text{ } \]
QUESTION 3
MC33e

Which best describes the product of the following reaction sequence?

1. Excess PCC/CH₂Cl₂ (solvnt)

2. 1 Equiv. / HCl (cat.)

3. Excess PhMgBr.THF

4. H₃O⁺

5. Na₂Cr₂O₇/H₂SO₄/H₂O

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Options:
A
B
C
D
QUESTION 4

Which best describes the product of the following reaction sequence?

1. BuLi
2. MeBr
3. H₃O⁺
4. Na₂Cr₂O₇/H₂SO₄
QUESTION 5
MC33r

Which is a correct IUPAC name for the following structure?

A  (5S)-hydroxycyclohex-2-enone
B  (5S)-hydroxycyclohexen-2-one
C  (5R)-hydroxycyclohex-2-enone
D  (5S)-hydroxycyclohex-2-eneone

lowest # for substituent is the alkene
ketone takes priority

(5S)-hydroxycyclohex-2-enone

name fragments

(5S)-hydroxy
cyclohexanone
2-ene

QUESTION 6
MC33n

Select the best reagents and conditions to perform the following ketone synthesis

1. BuLi  1. Excess BuLi  1. BuLi  1. BuLi
2. PrBr  2. EtBr  2. PrBr  2. EtBr
6. H₃O⁺

A  B  C  D

excess BuLi will not be able to deprotonate twice on the same carbon atom, once one proton has been removed, removing the second is MUCH harder since you are now trying to deprotonate an anion, thus only the PrBr adds

AND, adding an ethyl group isn't useful anyway!
QUESTION 7
MC33k

Give the best product for the following reaction

1. 1 Equiv. PhMgBr
2. H₃O⁺

the 1 equivalent of phenylmagnesium bromide must "choose" between the aldehyde and the ketone.

Aldehydes are more reactive than ketones, ketones have two weak donating alkyl groups to stabilize the partial positive charge on the carbon of the C=O bond, aldehydes only have one.

Neither donating or withdrawing.

Aldehyde

Ketone

BrMg⁻Ph
QUESTION 8
MC33d

Which best describes the product of the following reaction sequence?

1. Excess PCC
   
   2. Excess PhMgBr.THF

Everything in blue is what happens in the presence of excess PhMgBr