Coaching Report

Participant	roby SEl	**Student detail**	User_58
Group	ntc.it ats.perugia.it	**Status**	Ended normally
Assessment name	Organic Chemistry 3 - EN V4	**Final Score**	30
Time Used	00:01:56	**Time limit (min)**	60
Date taken	16-09-2016 11:03:41		

Questions - presented: 30, answered: 30

1 **Use the marker to select which one of the following compounds does not represent a monoterpene.**

Question type	Hotspot
Topic	Biomolecules
Difficulty	3/3
Score	3.3
Score max	1
Answer choosen	not ok
Answer	0) 228,171,523,270

2 **Use the marker to select which one of the following structures represents ascorbic acid (vitamin C).**

Question type	Hotspot

Topic	Biomolecules
Difficulty	3/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 312,3,443,120

3 **Use the marker to select which one of the compounds shown would be the major product in the reaction of thiophene with acetyl nitrate (a good nitrating agent).**

Question type	Hotspot
Topic	Ar Subst of Heteroaromatics
Difficulty	3/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 191,172,298,248

4 **Use the marker to select which one of the compounds shown below would be the major product in the reaction of 3-methyl pyridine under the condition given in the scheme.**

Question type	Hotspot
Topic	Ar Subst of Heteroaromatics
Difficulty	3/3
Score	0.0
Score max	1

Answer choosen	not ok
Answer	0) 352,149,491,235

5 **Use the marker to select which one of the compounds shown below would be the major product in the reaction of 1 with methyl magnesium bromide followed by acidic work up.**

Question type	Hotspot
Topic	Ar Subst of Heteroaromatics
Difficulty	3/3
Score	3.3
Score max	1
Answer choosen	not ok
Answer	0) 373,160,487,299

6 **Upon reaction of pyrrole with CHCl3 / KOH a mixture of 3-chloropyridine and 2-formylpyrrole is formed. Select which of the following statement(s) is (are) correct.**

Question type	Multiple Response
Topic	Ar Subst of Heteroaromatics
Difficulty	3/3
Score	1.65
Score max	1
Answer choosen	The products are separated using extraction with dilute acid.
Answer	0) A cyclopropane adduct of pyrrole and

dichlorocarbene is a common intermediate.

1) The products are separated using extraction with dilute acid.

2) The products are separated using extraction with dilute alkali.

3) 3-Chloropyridine is obtained independently by chlorination of pyridine under mild conditions.

7 **Select which of the following statements concerning the preparation of aminopyridines are correct.**

Question type	Multiple Response
Topic	Ar Subst of Heteroaromatics
Difficulty	3/3
Score	0.00
Score max	1
Answer choosen	not ok
Answer	0) 2-Aminopyridine is obtained from pyridine and NaNH2. 1) A mixture of 3- and 4-aminopyridines are formed from 3-chloropyridine and NaNH2 / NH3. 2) Pyridine and NaNH2 afford a mixture of 2- and 4-aminopyridines. 3) 3-Aminopyridine is formed exclusively from 3-chloropyridine and NaNH2 / NH3.

8 **Use the marker to select which one of the isomers of triaminocyclohexane shown below has the following spectroscopic properties in D2O.**

1H NMR: d = 2.74 (3H, tt, J = 3.9, 11.3 Hz), 1.97 (3H, td, J = 3.9, 12.8 Hz), 0.95 (3H, td, J = 11.3, 12.8 Hz).

Question type	Hotspot
Topic	Adv. Struct. Elucidation using Spectro
Difficulty	3/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 445,2,580,113

9 **Select the one of the following lines which describes the appearance of the molecular ion region in the mass spectrum of bromodichloromethane (79Br :81Br = 1:1; 35Cl :37Cl = 3:1; the contribution of 2H and 13C is ignored).**

Question type	Multiple Choice
Topic	Adv. Struct. Elucidation using Spectro
Difficulty	3/3
Score	0.00
Score max	1
Answer choosen	not ok
Answer	0) four peaks at m/z 162, 164, 166 and 168 (rel. int. 9:15:7:1) 1) four peaks at m/z 162, 164, 166 and 168 (rel. int. 3:1:1:1)

2) four peaks at m/z 162, 164, 166 and 168

(rel. int. 3:1:3:1)

3) a single peak at m/z 164

4) two peaks at m/z 166 and 168 (rel. int. 3:1)

10 **The molecular ion region in the mass spectrum of a mixture of naphthalene (C10H8) and monodeuterionaphthalene (C10H7D) has peaks at m/z 128, 129 and 130 (rel. int. = 100 : 111 : 11.6). What is the ratio of the two isotopomers (C10H8 / C10H7D) in the sample?**

(Assume that the stability and the fragmentation of the molecular ion are the same in both cases).

Question type	Multiple Choice
Topic	Adv. Struct. Elucidation using Spectro
Difficulty	3/3
Score	0.00
Score max	1
Answer choosen	100 :1
Answer	0) 100 :1
	1) 111 : 10
	2) 10 : 1
	3) 1 : 10
	4) 1 : 1

11 **Use the marker to select what is the first step in the radical polymerisation of ethene.**

Question type	Hotspot

Topic	Polymers
Difficulty	2/3
Score	3.3
Score max	1
Answer choosen	not ok
Answer	0) 1,49,432,103

12 **Select from the list below which stereoisomer(s) of tartaric acid is (are) formed on treatment of maleic acid with bromine.**

Question type	Multiple Choice
Topic	Cyclo-Add Rx, Rad add to Alkenes, StChem
Difficulty	2/3
Score	0.00
Score max	1
Answer choosen	only 3
Answer	0) only 3
	1) a 1:1 mixture of 1 and 2
	2) only 1
	3) only 2

13 **Select which one of the following statements concerning the structures 1 and 2 is correct.**

Question type	Multiple Choice
Topic	Resonance, Aromaticity
Difficulty	2/3
Score	0.00

Score max	1
Answer choosen	1 and 2 represent two easily interconvertable molecules (not tautomers)
Answer	0) 1 and 2 represent resonance structures of the same molecule 1) 1 and 2 represent tautomers 2) 1 and 2 represent two not easily interconvertable isomers 3) 1 and 2 represent two easily interconvertable molecules (not tautomers)

14 **Select which one of the following statements concerning the structures 1 and 2 is correct.**

Question type	Multiple Choice
Topic	Resonance, Aromaticity
Difficulty	2/3
Score	0.00
Score max	1
Answer choosen	1 and 2 represent resonance structures of the same molecule
Answer	0) 1 and 2 represent resonance structures of the same molecule 1) 1 and 2 represent tautomers 2) 1 and 2 represent two not easily interconvertable isomers 3) 1 and 2 represent two easily

interconvertable molecules (not tautomers)

15 **Calculate, using the data outlined below, the strain energy for the most stable conformer of (R,R)-2,3-dibromobutane.**

Interaction(gauche) Energy cost(kJ mol-1)

CH3----CH3 3.8

Br----BrC 3.0

H3----Br 1.0

The strain energy of the most stable conformer is in kJ/mol.

Question type	Text
Topic	Stereochem Cpds 2+ St.genic, Cyclic Cpds
Difficulty	2/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 5.0
	1) 5
	2) 5.0

16 **Use the marker to select the one of the compounds shown below which would undergo solvolysis (substitution of bromide by acetate) in acetic acid solution most rapidly.**

Question type	Hotspot
Topic	C+ Rearrgt, Beckman B-V, Hofman,Curtius
Difficulty	2/3
Score	3.3
Score max	1
Answer choosen	not ok
Answer	0) 221,10,296,165

17 **Select from the following sets of reagents and conditions the one which will most likely lead to the product shown in the reaction scheme.**

Question type	Multiple Choice
Topic	More Complex Synth, PG, Multistep
Difficulty	2/3
Score	0.00
Score max	1
Answer choosen	1. KMnO4 / H+; 2. benzene, AlCl3; 3. NaBH4
Answer	0) 1. C6H5MgBr/ether; 2. H2/Pd-C 1) 1. LiAlH4; 2. TosCl, pyridine; 3. C6H5Li 2) 1. C6H5MgBr/ether; 2. MnO2 3) 1. KMnO4 / H+; 2. benzene, AlCl3; 3. NaBH4

18 **Select from the list below the one set of starting materials which could be used to prepare compound 1 through a Knoevenagel reaction.**

Question type	Multiple Choice

Topic	Enolate Anion Chem, Michael Reactions
Difficulty	2/3
Score	0.00
Score max	1
Answer choosen	ethyl acetate, 6-methyl-hept-5-enyl bromide, NaOC2H5
Answer	0) ethyl acetoacetate, 6-methyl-hept-5-en-1-al, piperidine 1) ethyl acetoacetate, 6-methyl-5-heptenyl bromide, piperidine 2) ethyl acetate, 6-methyl-hept-5-enyl bromide, NaOC2H5 3) diethyl malonate, 6-methyl-hept-5-enyl bromide, NaH

19 **Use the marker to select which one of the compounds shown below is the major product in the following reaction.**

Question type	Hotspot
Topic	Enolate Anion Chem, Michael Reactions
Difficulty	2/3
Score	3.3
Score max	1
Answer choosen	not ok
Answer	0) 32,126,170,218

20 **Use the marker to select which one of the compounds shown below is the major product in the following reaction.**

Question type	Hotspot
Topic	Enolate Anion Chem, Michael Reactions
Difficulty	2/3
Score	3.3
Score max	1
Answer choosen	not ok light ochre to deep brown.
Answer	0) 172,109,288,194

21 **Use the marker to select which one of the compounds shown below will undergo a SN2 substitution most rapidly.**

Question type	Hotspot
Topic	Further Substn & Elim Rx, StChem of Elim
Difficulty	1/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 292,1,417,108

22 **Which one of the following statements concerning SN1 reactions is correct ?**

Question type	Multiple Choice
Topic	Further Substn & Elim Rx, StChem of Elim
Difficulty	1/3
Score	0.00

Score max	1
Answer choosen	not ok
Answer	0) SN1 reactions at a chiral centre sometimes give a product that retains some optical activity. 1) With a common nucleophile the rate of a SN1 reaction of a tertiary alkyl halide is slower than that of a primary alkyl halide halves the reaction rate. 2) SN1 reactions are faster for strong nucleophiles than for weak nucleophiles. 3) SN1 reactions are slower for strong nucleophiles than for weak nucleophiles.

23 **Which one of the following compounds is a particularly toxic and dangerous agent ?**

Question type	Multiple Choice
Topic	Safety, Solvents
Difficulty	1/3
Score	0.00
Score max	1
Answer choosen	Methanol
Answer	0) Carbon disulfide (CS2) 1) Dimethylformamide (DMF) 2) Methanol 3) 1,2-Dichloroethane

24 **Use the marker to select which one of the compounds shown below has the following set of 1H NMR signals.d = 2.00 (3H, s); 4.25 (1H, dd, J = 1.4, 6.4 Hz); 4.78 (1H, dd, J = 1.4, 14.0 Hz); 6.90 (1H, dd, J = 6.4, 14.0 Hz).**

Question type	Hotspot
Topic	Adv. Struct. Elucidation using Spectro
Difficulty	1/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 124,8,229,84

25 **Which one of the following statements concerning 3-chloro-pentane (1) is correct?**

Question type	Multiple Choice
Topic	Resonance, Aromaticity
Difficulty	1/3
Score	0.00
Score max	1
Answer choosen	Compound 1 has no dipole moment due to its symmetry.
Answer	0) Compound 1 is chiral. 1) The difference in electronegativity between carbon and chlorine causes the C-Cl bond to be polarised such that the chlorine atom bears a small negative charge.

2) Compound 1 has no dipole moment due to its symmetry.

3) The carbon atom bearing the chlorine is sp2 hybridised.

26 **How does the hybridisation of the carbonyl carbon change in the following reaction?**

Question type	Multiple Choice
Topic	Resonance, Aromaticity
Difficulty	1/3
Score	0.00
Score max	1
Answer choosen	sp2 to sp
Answer	0) sp2 to sp 1) sp3 to sp2 2) sp2 to sp3 3) sp to sp3 4) no change

27 **How does the hybridisation of the carbonyl carbon change in the following reaction?**

Question type	Multiple Choice
Topic	Resonance, Aromaticity
Difficulty	1/3
Score	3.30
Score max	1

Answer choosen	sp2 to sp3
Answer	0) sp2 to sp
	1) sp3 to sp2
	2) sp2 to sp3
	3) sp to sp3
	4) no change

28 **Use the marker to select which one of the following compounds will be converted into benzoic acid upon reaction with KMnO4?**

Question type	Hotspot
Topic	Redox Reactions
Difficulty	1/3
Score	0.0
Score max	1
Answer choosen	not ok
Answer	0) 5,18,139,107

29 **Select from the list below the correct order of reactivity of the following carbonyl compounds towards nucleophiles.**

Question type	Multiple Choice
Topic	Enolate Anion Chem, Michael Reactions
Difficulty	1/3
Score	0.00
Score max	1
Answer choosen	1 3 4 2
Answer	0) 1 4 2 3

1) 1 3 4 2

2) 4 2 1 3

3) 3 2 4 1

30 **Which one of the following compounds is not formed in the reaction of ethene with bromine water containing nitrate and chloride ions ?**

Question type	Multiple Choice
Topic	Cyclo-Add Rx, Rad add to Alkenes, StChem
Difficulty	1/3
Score	3.30
Score max	1
Answer choosen	Cl(CH2)2Cl
Answer	0) Cl(CH2)2Cl
	1) Br(CH2)2ONO2
	2) Br(CH2)2OH
	3) Br(CH2)2Cl
	4) Br(CH2)2Br