

Natural Forest Products Chemistry

-Midterm (2008. 4. 22)

Name :	SCORE	
Student No :		

1. The following solvents are frequently used for extracting useful compounds from natural resources. The extraction process is usually dependent upon the polarity of solvent. Put in the order of solvent polarity. (4)
-Hexane, water, chloroform, butanol, ethyl acetate, petroleum ether
2. What kinds of base peaks from the following compounds in mass spectrometry can you obtain? (4)
-CH₃OH, CH₃-(C=O)H, CH₃-O-(C=O)-CH₃, CH₃-CH=CH-CH₂-CH₃
3. How can you expect the spectra of compound CH₃CH₂-(C=O)-CH₂-CH₂-(C=O)-OH using ¹H-NMR and FT-IR spectrometers. Draw the expected spectra. (6)
4. What is the characteristic difference between C3 and C4 cycles in photosynthesis? (4)
5. Explain how the isoprenoids (monoterpene, sesquiterpene, diterpene and triterpene) are biosynthesized. (6)
6. Illustrate briefly the screening process for obtaining bioactive compounds from natural sources. (6)
7. Explain briefly (2points X 10 = 20)
 - ① Anomer
 - ② Epimer
 - ③ Geminal coupling
 - ④ Conformer
 - ⑤ Sophorose (chemical structure)
 - ⑥ HPLC
 - ⑦ Lambert-Beer Law

⑧ Agarose (chemical structure)

⑨ β -cyclodextrin

⑩ Aglycone

Natural Forest Products Chemistry

-Final (2008. 6. 10)

Name :	SCORE	
Student No :		

1. Cyclic monoterpenes are synthesized by cyclization of neryl pyrophosphate (NPP), a isomer of geranyl pyrophosphate (GPP). Explain how camphane is formed from pinene. (6)
2. What is the structural difference of lignan, neolignan, and norlignan, and show their representative examples. (6)
3. Illustrate briefly the chemical difference of Green Tea and Red Tea. (4)
4. What kinds of extractive chemicals can you obtain from woody biomass? And show their utilization. (4)
5. When you visit an industrial area where heavy metals are polluted, how can you suggest for removing heavy metals in polluted water by using natural forest products? (4)
6. There are essential amino acids for human nutrition balance. Draw their chemical structures (more than 6 amino acids). (6)
7. Draw a chemical structure of each compound (1-14) or explain briefly (15-20)
(2points X 20 = 40)
 - ① Citral
 - ② Curcumin
 - ③ Phenethylamine alkaloids
 - ④ Abscisic acid
 - ⑤ Kaempferol
 - ⑥ Adipic acid
 - ⑦ Succinic acid
 - ⑧ Eugenol
 - ⑨ Proanthocyanidin
 - ⑩ Iridomyrmecin

- | | |
|--|---------------------------------|
| ⑪ 1,2-Naphthoquinone | ⑫ Diethylamide of vanillic acid |
| ⑬ Myrcene | ⑭ Delphinidin |
| ⑮ What is polyporic acid? | ⑯ What is Paclitaxel? |
| ⑰ First sesterterpene isolated from nature | ⑱ What is Saponin? |
| ⑲ Utilization of ligninsulfonates | ⑳ Effect of gibberellin |

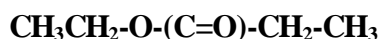
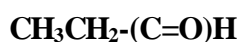
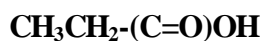
Natural Forest Products Chemistry

-Midterm (2009. 4. 23)

Name :	SCORE	
Student No :		

1. Illustrate the characteristic role of light reaction in photosynthesis? (4)

2. What kinds of fragmented peaks from the following compounds in mass spectrometry can you possibly obtain? (8)



3. Explain how the FPP(farnesyl pyrophosphate) are biosynthesized through photosynthesis and mevalonic acid pathway. (8)

4. How can you expect the spectra of the following compound using $^1\text{H-NMR}$ and FT-IR spectrometers. Draw the expected spectra. (6)

5. Illustrate briefly the biosynthetic pathway of carotenoids starting from DAPP and IPP.
(4)

6. Explain briefly (2points X 10 = 20)

- ① Squalene
- ② Acyl
- ③ Coniferin
- ④ Pectin
- ⑤ Reverse HPLC
- ⑥ Deshielding effect(NMR)
- ⑦ Fischer-Rosanoff Rule
- ⑧ Index of Hydrogen Deficiency : $C_2H_3F_3O_2$
- ⑨ Reverse Aldol reaction
- ⑩ Maltose (chemical structure)

Natural Forest Products Chemistry

-Final (2009. 6. 9)

Name :	SCORE	
Student No :		

1. Humulene and caryophyllene were 11 membered cycles, which were formed through double bond formation by detachment of pyrophosphate group from FPP, but there was a little difference in cyclization of both compounds. What is the difference? (4)
2. What kinds of low molecular weight chemicals can you obtain from technical lignins? And show their utilization. (6)
3. Explain briefly the difference in the chemical composition between Green Tea and Red Tea. (4)
4. Explain the biosynthesis (A and B cycles) of flavonoids, their characteristics and kinds including specific skeletal backbone. (6)

5. Cyclic monoterpenes are synthesized by cyclization of neryl pyrophosphate (NPP). Explain how borneol is formed. (6)

6. Draw a chemical structure of each compound or explain (*marked) briefly
(2points X 20 = 40)

- | | |
|--------------------------|----------------------------|
| ① L-Tryptophan | ② Epigallocatechin |
| ③ Hinokiresinol | ④ Indole alkaloid |
| ⑤ Dilignol* | ⑥ Utilization of tall oil* |
| ⑦ L-Lysine | ⑧ 3,5,7-trihydroxyflavone |
| ⑨ Fumigatan | ⑩ Vitamin K* |
| ⑪ Effect of gibberellin* | ⑫ Pyrethroid* |
| ⑬ Juvenile Hormone* | ⑭ Balsam* |
| ⑮ Coumarin* | ⑯ Ferulic acid |
| ⑰ Palmitoleic | ⑱ Sesamin |
| ⑲ Sphingophospholipid* | ⑳ Resveratrol |

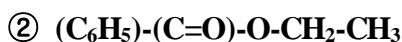
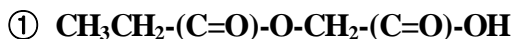
Natural Forest Products Chemistry

-Midterm (2010. 4. 21)

Name :	SCORE	
Student No :		

1. Illustrate briefly the screening process for obtaining bioactive compounds from natural resources. (6)
2. Illustrate the characteristic biosynthetic pathway of the p-coumaryl alcohol through photosynthesis and shikimic acid pathway. (6)
3. What kinds of fragmented peaks from the following compounds in mass spectrometry can you possibly obtain? (8)
 - ① $(C_6H_5)-CH_2-CH_2-CH_2-CH_3$ (C_6H_5- = aromatic ring)
 - ② $CH_3CH_2-(C=O)-OH$
 - ③ $CH_3CH_2-O-CH_2-CH_3$
 - ④ $(C_6H_5)-CH_2-CH=CH-CH_3$

4. How can you expect the spectra of the following compounds using $^1\text{H-NMR}$ and FT-IR spectrometers. Draw the expected spectra. (8)



6. Explain briefly (2points X 11 = 22)

① Carotenoid

② Principle of UV/Vis spectrometry

③ Carbonium ion

④ PSI vs PSII

⑤ Gas Chromatography

⑥ Anisotropic effect (NMR)

⑦ 3 proteins in Z scheme which is transferring reducing power from water

⑧ Index of Hydrogen Deficiency : $\text{C}_{10}\text{H}_{15}\text{ClN}_2\text{O}_2$

⑨ Inductive effect of proton in $^1\text{H-NMR}$

⑩ Vicinal coupling (NMR)

⑪ GFPP (terpenoid)

Natural Forest Products Chemistry

–Midterm (2010. 6. 16)

Name :	SCORE	
Student No :		

1. Explain the biosynthesis pathway (A and B cycles) of flavonoids, their characteristics and kinds including specific skeletal backbone. (6)
2. What is the structural difference of lignan, neolignan, and norlignan, and show their representative examples. (6)
3. When you visit an industrial area where heavy metals are polluted, how can you suggest for removing heavy metals in polluted water by using natural forest products? (4)
4. Explain briefly the difference in the chemical composition between Green Tea and Red Tea. (4)

5. Cyclic monoterpenes are synthesized by cyclization of neryl pyrophosphate (NPP), a isomer of geranyl pyrophosphate (GPP). Explain how camphene is formed from pinene. (6)
6. Draw a chemical structure of each compound or explain briefly (2points X 20 = 40)
- | | |
|--------------------------|--|
| ① Fischer-Rosanoff rule | ② Utilization of ligninsulfonates |
| ③ N-acetylglucosamine | ④ Phytyl |
| ⑤ Sphingophospholipid | ⑥ Phospatidyl |
| ⑦ Maltose | ⑧ Diethylamide of vanillic acid |
| ⑨ Curcumin | ⑩ Agarose |
| ⑪ Piperidine alkaloid | ⑫ Fumigatan |
| ⑬ Iridodial | ⑭ First sesterterpene isolated from nature |
| ⑮ Juvenile Hormone | ⑯ 3,5,7-trihydroxyflavone |
| ⑰ Eudesmol | ⑱ β -Cyclodextrin |
| ⑲ Reverse aldol reaction | ⑳ Conformer |

Natural Forest Products Chemistry

-Midterm (2011. 4. 13)

Name :	SCORE	
Student No :		

1. Illustrate the characteristic role of light and dark reactions in photosynthesis? (6)
2. What kinds of fragmented peaks from the following compounds in mass spectrometry can you possibly obtain? (8)
- ① $(C_6H_5)-CH_2-OH$ ($C_6H_5 =$ aromatic ring)
 - ② $CH_3CH_2-(C=O)-CH_3$
 - ③ $CH_3CH_2-O-CH_3$
 - ④ $CH_3-(C=O)-O-CH_2-CH=CH-CH_3$
3. Illustrate the important functions or roles of carbohydrates in organisms. (4)
4. Explain the biosynthetic pathway of GPP(geranyl pyrophosphate) starting from photosynthesis. (6)
5. How can you expect the spectra of the following compounds using 1H -NMR and FT-IR spectrometers. Draw the expected spectra. (8)
- ① $(C_6H_5)-(C=O)-O-CH_3$



6. Explain briefly (2points X 9 = 18)

- ① Acyl
- ② Lambert-Beer Law
- ③ DAPP (terpenoid)
- ④ Photophosphorylation
- ⑤ Shikimic acid
- ⑥ Ribulose-1,5-diphosphate
- ⑦ 3 proteins in Z scheme which is transferring reducing power from water
- ⑧ CAM
- ⑨ Coumarin

Natural Forest Products Chemistry

–Midterm (2011. 6. 15)

Name :	SCORE	
Student No :		

1. Illustrate the structural difference of lignan, neolignan, norlignan, sesquilignan and dilignan, and show their representative example. (5)
2. Draw a chemical structure of each compound (1 point X 20 = 20)
 - ① Cyclic hemiacetal of D-galactose
 - ② Eugenol
 - ③ Furfural
 - ④ Curcumin
 - ⑤ Pyrrolidine alkaloid
 - ⑥ Naringenin
 - ⑦ Cadinene
 - ⑧ Iridomyrmecin
 - ⑨ Resveratrol
 - ⑩ Sugiresinol
 - ⑪ Epigallocatechin
 - ⑫ L-Lysine
 - ⑬ Sesamin
 - ⑭ ${}^4\text{C}^1$ Conformer of $\alpha\text{-D-glucopyranose}$
 - ⑮ Citronellol
 - ⑯ Eicosapentaenoic acid
 - ⑰ Cinnamic acid
 - ⑱ Geraniol
 - ⑳ 2-Oleyl-1,3-distearylglycerol
3. Cyclic monoterpenes are synthesized by cyclization of neryl pyrophosphate (NPP), a isomer of geranyl pyrophosphate (GPP). Explain how fenchyl alcohol is formed from pinene. (6)

4. Explain specific skeletal backbone of flavonoids, and their characteristics. (5)

5. Explain briefly (1 point X 18 = 18)

- | | |
|---------------------------|--------------------------|
| ① Reducible sugar | ② Phospatidyl |
| ③ C-glycoside | ④ Smith degradation |
| ⑤ Agarose | ⑥ Podophyllotoxin |
| ⑦ Juvenile Hormone | ⑧ Dilignol |
| ⑨ Saponin | ⑩ γ -Cyclodextrin |
| ⑪ Amylose and amylopectin | ⑫ Laminaran |
| ⑬ Aglycone or genin | ⑭ Enterodiol |
| ⑮ Absciscic acid | ⑯ Pectin |
| ⑰ Rhatannin | ⑱ Theaflavin |