3. Indicate the major product in the following reaction.

\[
\begin{array}{c}
\text{NH}_2\text{OH} \\
\text{H}^+, \text{EtOH}
\end{array}
\]

\[
\text{II}
\]

A. I;  
B. II;  
C. III;  
D. IV.

9. Which of the compounds listed below is chiral?

A. *Trans*-1,2-dibromocyclohexane;  
B. *Cis*-1,2-dibromocyclohexane;  
C. *Cis*-1,4-dibromocyclohexane;  
D. *Trans*-1,4-dibromocyclohexane;  
E. All of these.

13. What is the name of the following compound according to the IUPAC rules?

A. 3-iodo-1-methyl-2-isopropyl-pentan-1-ol;  
B. 4-iodo-3-ethyl-2-isopropyl-butan-1-ol;  
C. 1-iodo-2-ethyl-3-isopropyl-butan-4-ol;  
D. 1-(iodomethyl)-2-isopropyl-pentan-5-ol;
22. Indicate the pair of molecules / ions of planar square symmetry:
A. BeF$_4^{2-}$, Ni(CN)$_4^{2-}$;
B. AlCl$_4^-$, Hgl$_4^{2-}$;
C. Pt(H$_2$O)$_4^{2+}$, Hgl$_4^{2-}$;
D. Ni(CN)$_4^{2-}$, XeF$_4$.

28. Concentrations of Ag(NH$_3$)$_2^+$ and Ag(NH$_3$)$_3^+$ complexes are equal for excess concentration of NH$_3$ equal to (summary stability constants for complexes of Ag$^+$ with NH$_3$: $\beta_1 = 10^{3.4}$, $\beta_2 = 10^{7.4}$):
A. 10$^{-1}$ M;
B. 10$^{-2}$ M;
C. 10$^{-3}$ M;
D. 10$^{-4}$ M.

34. The total energy (relativistic) of a particle with mass equal to the rest mass of proton is circa (velocity of light in vacuum: 300 000 km/s):
A. 10$^{-10}$ J;
B. 10$^{-5}$ J;
C. 10$^{-2}$ J;
D. 10$^2$ J.

43. Nitrogen, N$_2$, has the following properties (marked with a, b, c and d characters):
a. melting point (for pressure = 10$^5$ Pa) : 63.2K
b. boiling point (for pressure = 10$^5$ Pa) : 77.4 K
c. triple point : 0.127 x 10$^5$ Pa, 63.1 K
d. critical point : 33.5 x 10$^5$ Pa, 126.0 K

45. The equilibrium constant of the esterification reaction proceeding between the acetic acid and ethanol at the temperature T is equal to 4.0. How many grams of water should be added to a mixture of 1.0 mol of acetic acid and 2.0 moles of ethanol if the yield of this reaction is equal to 50%:
A. 99;
B. 9.0;
C. 19.8;
D. 36.
58. Which group of hydrogen atoms (in the following compound) should appear at a highest ppm in the $^1H$ NMR spectrum?

A. I;
B. II;
C. III;
D. IV.