Chemistry 251/261 Quiz 3

Name:__________________________

1. (10 pts) Provide structures for the following names.

\[
\begin{align*}
\text{Cl} & \quad \text{(S)-1-ethyl-1-fluoro-2,2-dimethylcyclopentane} \\
\text{isobutyl chloride} & \\
\end{align*}
\]

2. (15 pts) Based on the BDE energies given, determine whether the reaction below is exothermic or endothermic, then draw a reaction coordinate diagram for the following reaction. Be sure to include the following features:

a. exothermic or endothermic reaction
b. label the rate determining step
c. show any reactive intermediates at the appropriate place in the reaction coordinate diagram
d. give the rate expression for this reaction

```
\text{Br} \quad \text{CH}_3 \\
\text{CH}_3 \\
\text{+ EtOH} \quad \xrightarrow{\Delta} \quad \text{EtO} \quad \text{CH}_3 \\
\text{CH}_3
```

\[
\begin{align*}
\text{65 + 115} & = \text{180 kcal/mol} \\
\text{96 + 88} & = \text{184 kcal/mol}
\end{align*}
\]

- **Enthalpy** = 180 - 184 = -4 kcal/mol = **exothermic**
- **Rate** = \(k\left[\text{Br} \quad \text{CH}_3\right]\)
- '\text{EXOTHERMIC}'
- **ENDOTHERMIC**

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3. (15 pts) Predict whether the following conditions would mainly promote an $S_N^2$ or $S_N^1$ mechanism. Draw the **major product** in each reaction and show stereochemistry where appropriate.

A. $S_N^1$

\[
\text{CH}_3\text{OH} \quad \Delta \quad \text{SN}_1 \quad \text{product} \quad \text{structure}
\]

B. $S_N^2$

\[
\text{NaCN} \quad \text{THF} \quad \text{SN}_2 \quad \text{product} \quad \text{structure}
\]

C. $S_N^2$

\[
\text{Na} \quad \text{S-CH}_3 \quad \text{DMF} \quad \text{SN}_2 \quad \text{product} \quad \text{structure}
\]

4. (10 pts) Give the appropriate starting material or reagent for the following transformations.

A. \[
\text{starting material} \quad \text{Sn2} \quad \text{product} \quad \text{structure}
\]

B. \[
\text{starting material} \quad \text{Sn2} \quad \text{product} \quad \text{structure}
\]

any good leaving group here is OK.