

## CHEM 3590 Instrumental Analysis

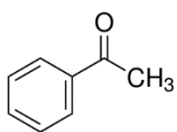
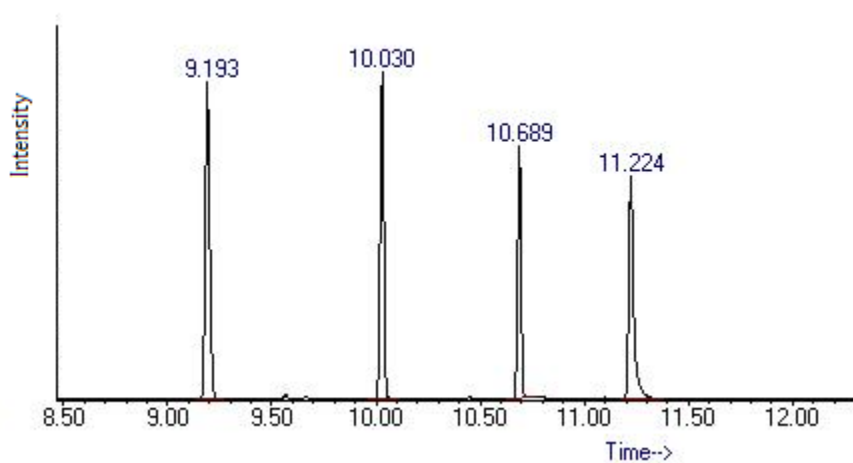
Test 2, November 13, 2015

Parker 539 Time: 10:30-11:30 am VERSION A

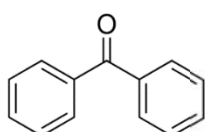
Please answer 8 questions out of 10. Only 8 questions will be marked. All questions are weighed equally.

### Question 1:

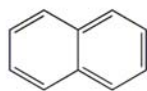
A mixture of the four compounds analyzed by gas chromatography (GC) produced the following result:



acetophenone



benzophenone



naphthalene



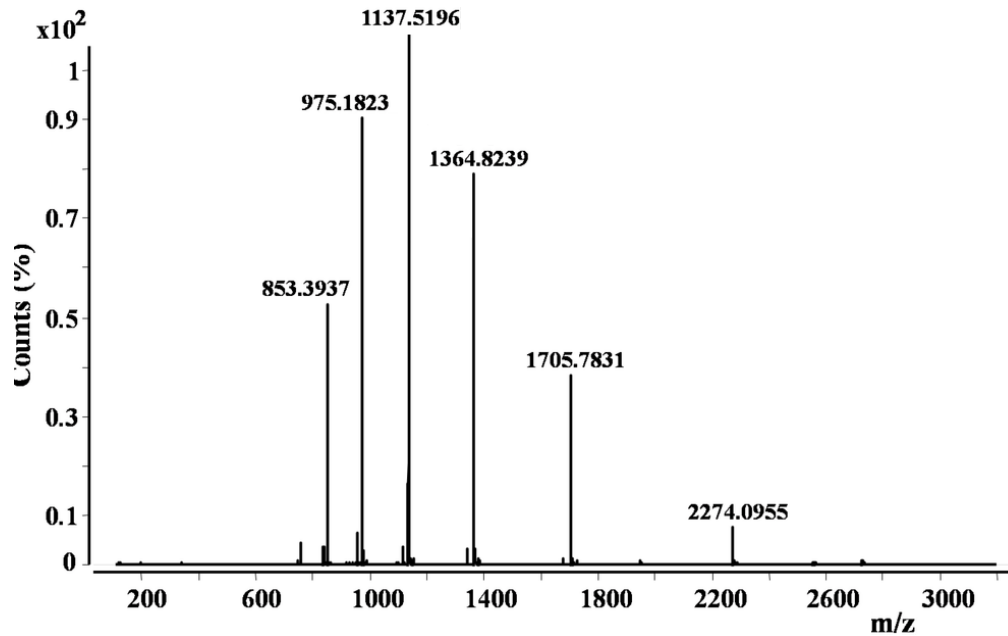
pyridine

- Assign each compound to its appropriate peak. Justify.
- Give three parameters that could be changed to make all compounds elute faster.



**Question 6:**

Calculate the molecular mass of the compound that produced this electrospray spectrum:

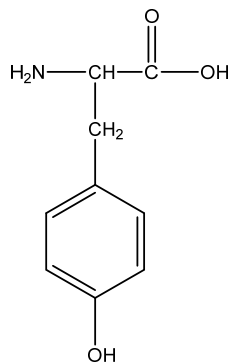


**Question 7:**

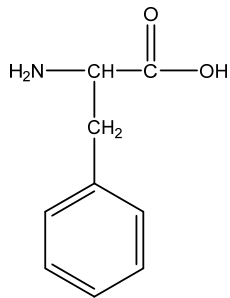
In the equation  $K_{av} = \frac{V_r - V_0}{V_m - V_0}$  which is relevant to size exclusion chromatography, define each term ( $V_r$ ,  $V_m$ ,  $V_0$ ) and explain how it is measured.

**Question 8:**

Two amino acids, tyrosine and phenylalanine, are to be separated by anion exchange chromatography on trimethylbenzylammonium beads ( $pK_a = 9.8$ ).



Tyrosine,  $pI = 5.66$



Phenylalanine,  $pI = 5.48$

If the mobile phase is at pH 7, which amino acid forms the stronger interaction with the beads (and will elute second)? Justify.

**Question 9:**

How does an electron capture detector create a signal when analyzing halogenated compounds by GC?

**Question 10:**

The chromatogram below was obtained at a single absorbance wavelength (254 nm) for a mixture of polycyclic aromatic compounds. Is it possible to relate relative peak heights directly to concentrations in the sample? Justify.

