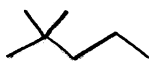
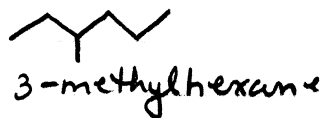
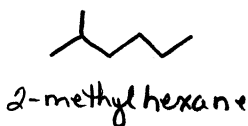


## Chem 2114 Unit 2 - Solutions

1.  $C_{27}H_{56}$

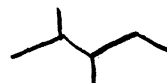
2.  $C_{18}H_{36}$



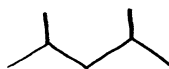
2,2-dimethylpentane



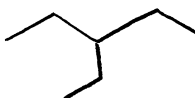
3,3-dimethylpentane



2,3-dimethylpentane



2,4-dimethylpentane



3-ethylpentane



2,2,3-trimethylbutane

4. a) 3-ethyl-2,6-dimethylheptane

b) sec-butylcyclohexane

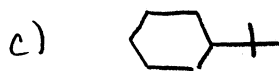
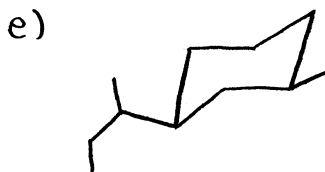
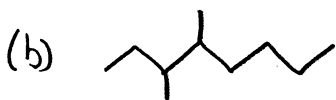
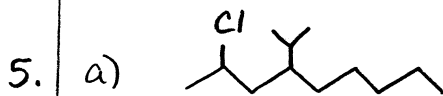
c) 6-bromo-2,5,7-trimethylnonane

d) 5-*t*-butyl-3-ethyl-3-methylnonane

e) *cis*-1-bromo-3-isobutylcyclohexane

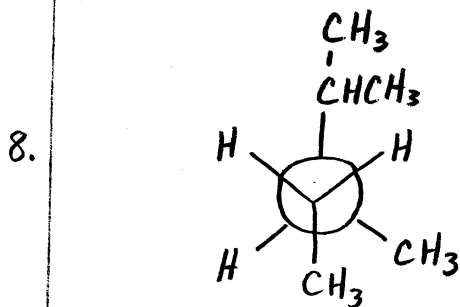
4. f) *trans*-1,2-dimethylcyclopentane

g) bicyclo[3.2.1]octane

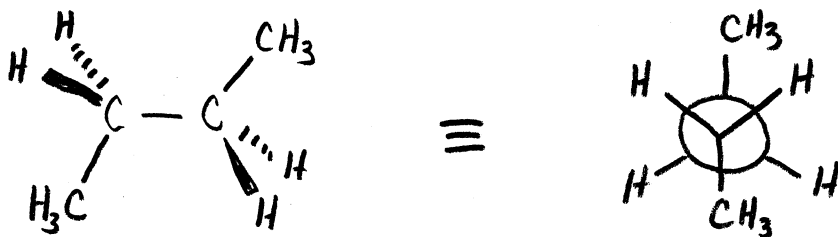



6. has higher BP  $\Rightarrow$  more linear

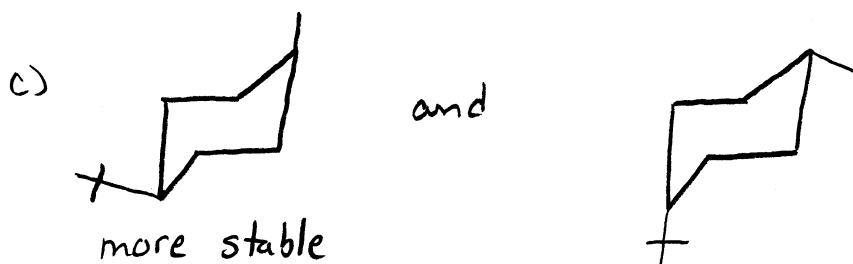
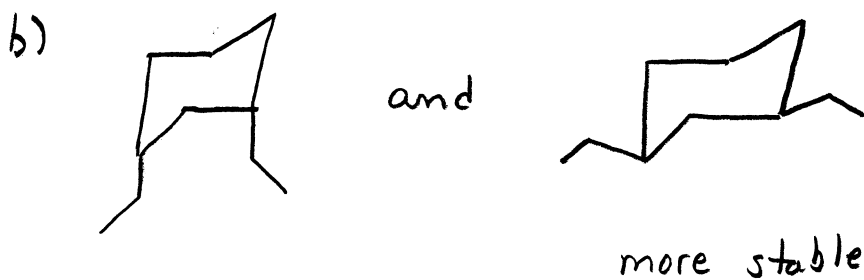
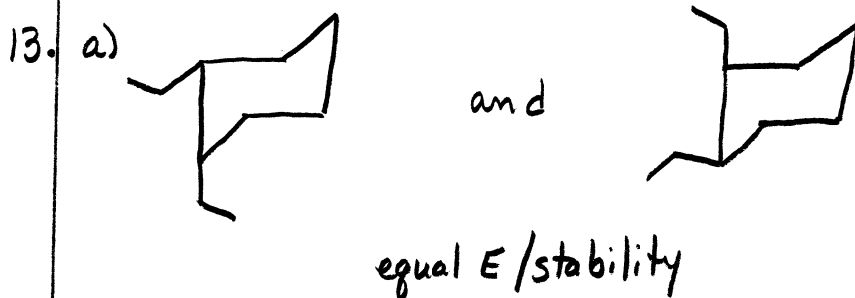
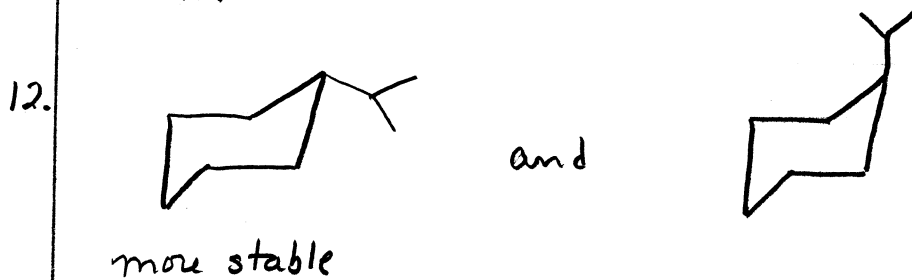
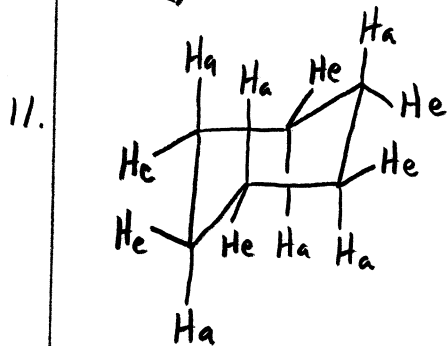
7. should have higher MP  $\Rightarrow$  more spherical  
better packing

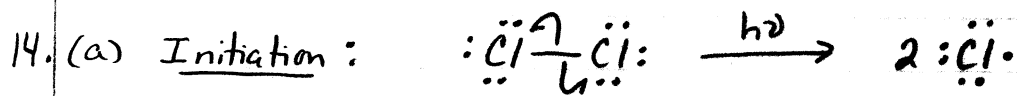


9. The anti conformer.

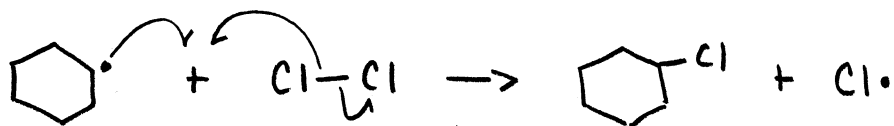
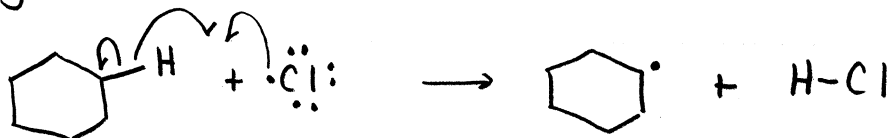


10.  is lowest in energy.

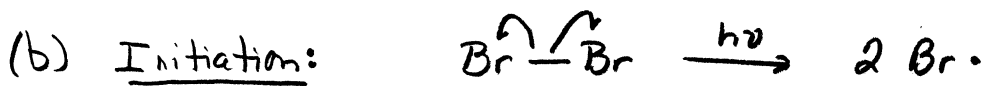




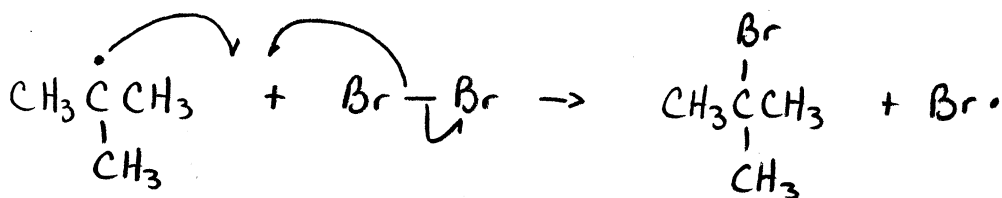
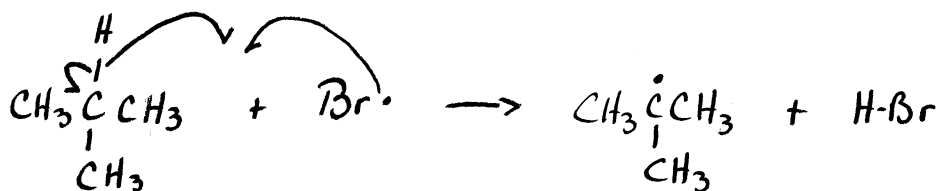
Propagation:



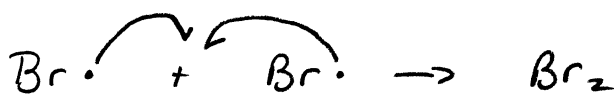
Termination: (Note: Many are possible!)



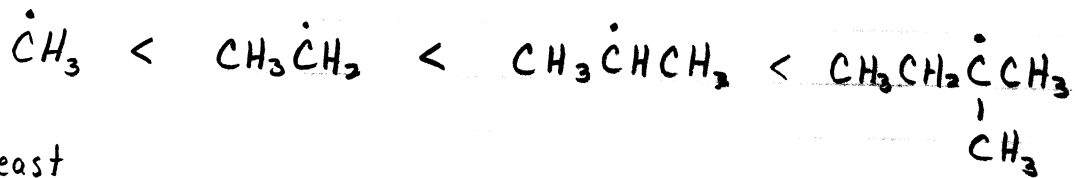
Propagation:



Termination (one example)

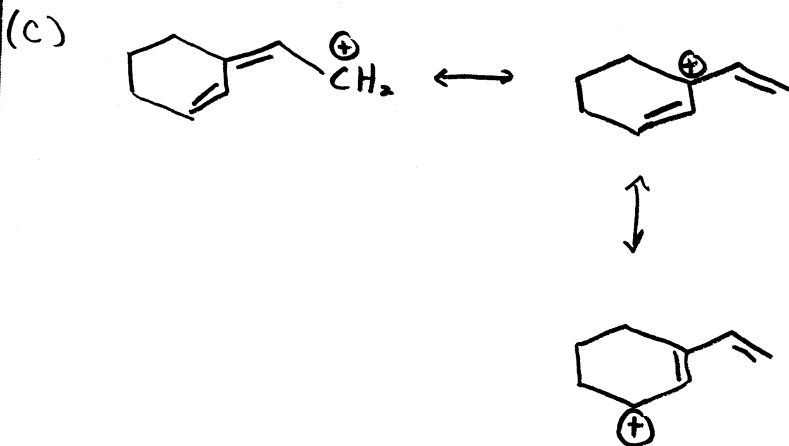
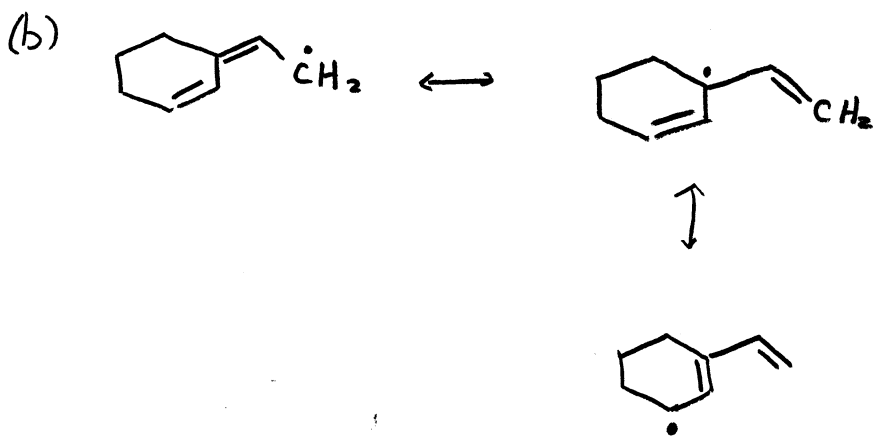
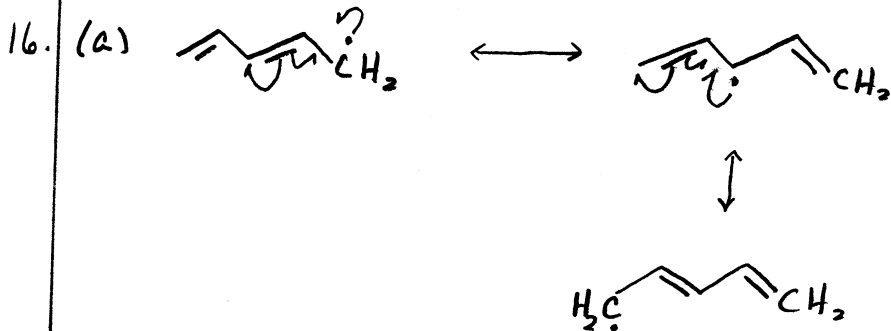


15.



least  
stable

most stable

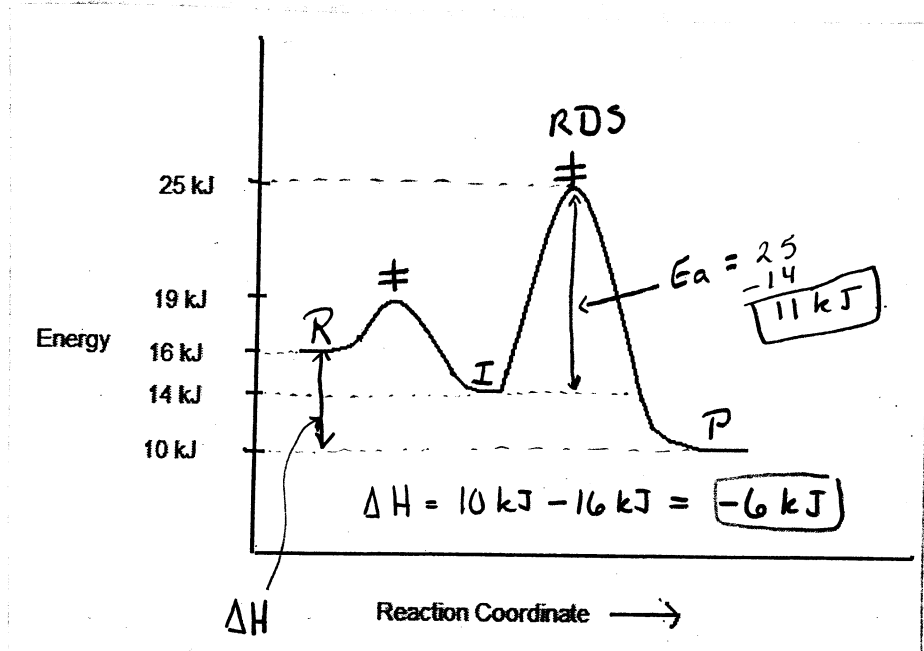


17.  $\text{Rate} = k[A]^2[B]$

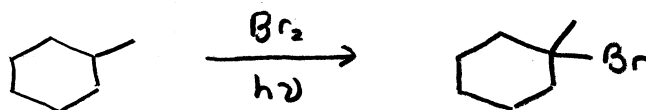
IF  $[A] = \times 3$ , then rate increases by a factor of 9.

IF  $[B] = \frac{1}{2}$ , then rate is  $\frac{1}{2}$  as fast.

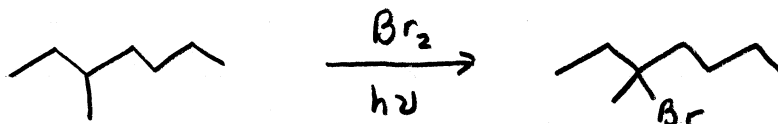
18.

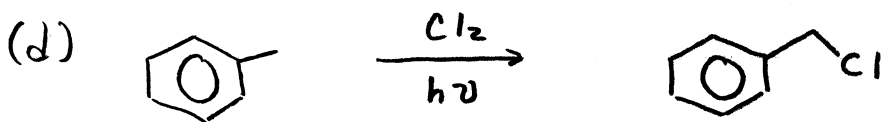
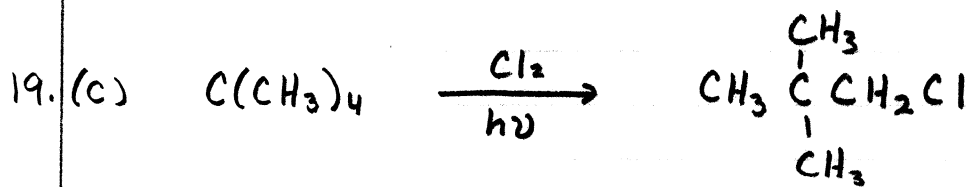


19. (a)

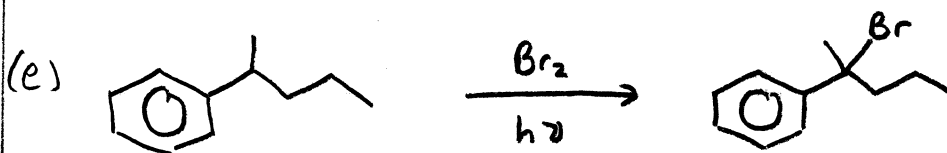


(b)

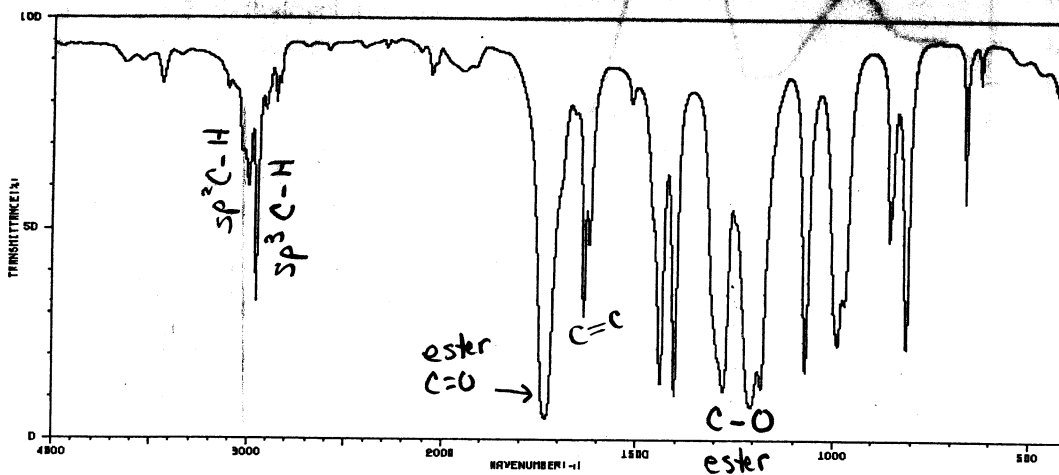




Remember: you will not put a chlorine on an aromatic ring using these conditions.



20. Assign the major peaks in the following IR spectrum.



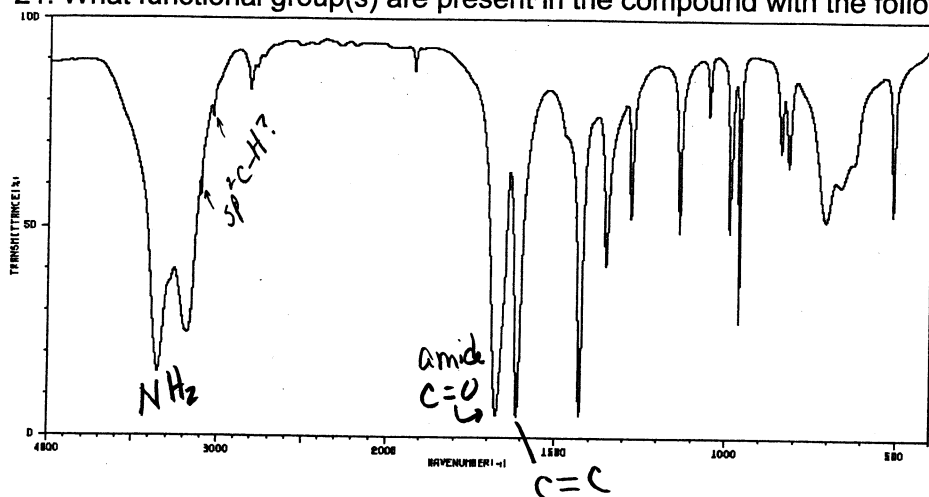
|      |    |      |    |      |    |      |    |
|------|----|------|----|------|----|------|----|
| 3632 | 86 | 2856 | 77 | 1621 | 44 | 1070 | 16 |
| 3444 | 81 | 2836 | 81 | 1516 | 77 | 988  | 21 |
| 3107 | 79 | 2061 | 64 | 1440 | 12 | 971  | 31 |
| 3031 | 66 | 2037 | 66 | 1404 | 10 | 856  | 46 |
| 2998 | 58 | 1945 | 84 | 1279 | 10 | 812  | 21 |
| 2956 | 31 | 1732 | 4  | 1209 | 7  | 653  | 55 |
| 2910 | 74 | 1636 | 27 | 1183 | 11 | 626  | 81 |

An unsaturated ester  
 - alkene } functional groups present  
 - ester }

Actual compound =

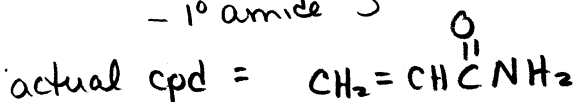


21. What functional group(s) are present in the compound with the following spectrum?

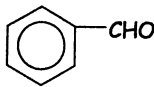
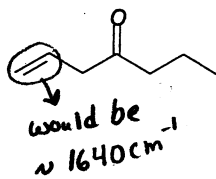
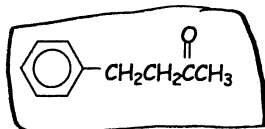


|      |    |      |    |     |    |
|------|----|------|----|-----|----|
| 3362 | 14 | 1676 | 6  | 990 | 47 |
| 3179 | 23 | 1613 | 4  | 962 | 26 |
| 3105 | 55 | 1430 | 5  | 840 | 86 |
| 3034 | 72 | 1363 | 39 | 819 | 62 |
| 2813 | 79 | 1281 | 50 | 709 | 50 |
| 2791 | 84 | 1138 | 47 | 664 | 58 |
| 1921 | 84 | 1062 | 74 | 610 | 62 |

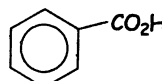
an unsaturated 1° amide  
 - alkene } functional groups  
 - 1° amide }



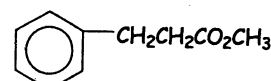
22. Which of the following compounds best matches the IR spectrum shown below?



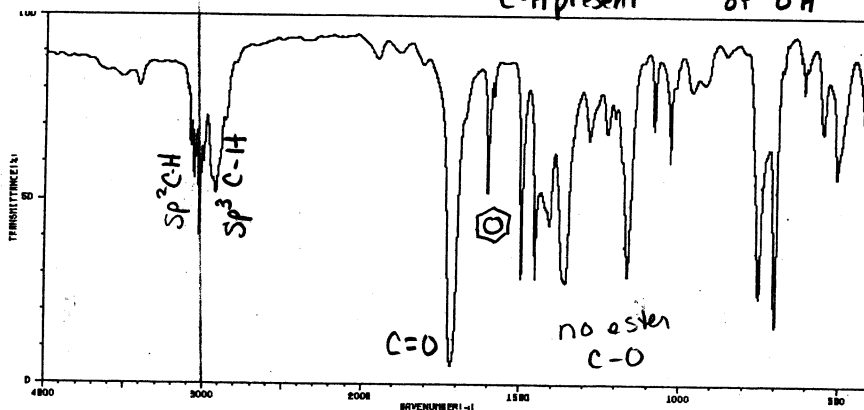
no aldehyde C-H present



no evidence of OH



C=O too low + no ester C-O present



|      |    |      |    |      |    |      |    |     |    |
|------|----|------|----|------|----|------|----|-----|----|
| 3620 | 79 | 2926 | 50 | 1464 | 27 | 1081 | 66 | 622 | 84 |
| 3411 | 77 | 1951 | 84 | 1409 | 41 | 1031 | 58 | 609 | 77 |
| 3087 | 82 | 1809 | 84 | 1358 | 26 | 961  | 77 | 601 | 81 |
| 3063 | 63 | 1717 | 4  | 1284 | 64 | 921  | 79 | 593 | 84 |
| 3028 | 38 | 1603 | 50 | 1228 | 66 | 856  | 86 | 549 | 66 |
| 3004 | 58 | 1584 | 74 | 1205 | 70 | 750  | 22 | 506 | 53 |
| 2947 | 63 | 1497 | 27 | 1163 | 27 | 700  | 16 | 498 | 68 |

C=O @ 1717 cm⁻¹ is typical of an unconjugated aldehyde, ketone, or carboxylic acid. See notes below each compound for information used to exclude the other possible structures.