

1-7) Indicate what any 7 of these Mass Spectrometry terms stand for.

**M/Z**

**APCI**

**QQQ**

**MALDI**

**HPLC**

**GCMS**

**FAB**

**ESI**

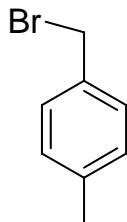
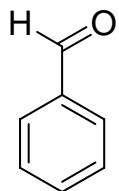
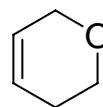
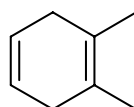
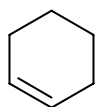
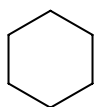
**HRMS**

**TOF**

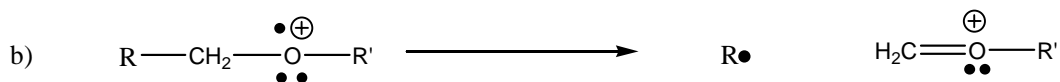
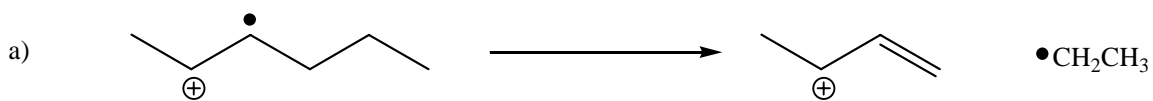
**(MS)<sup>2</sup>**

**AMU**

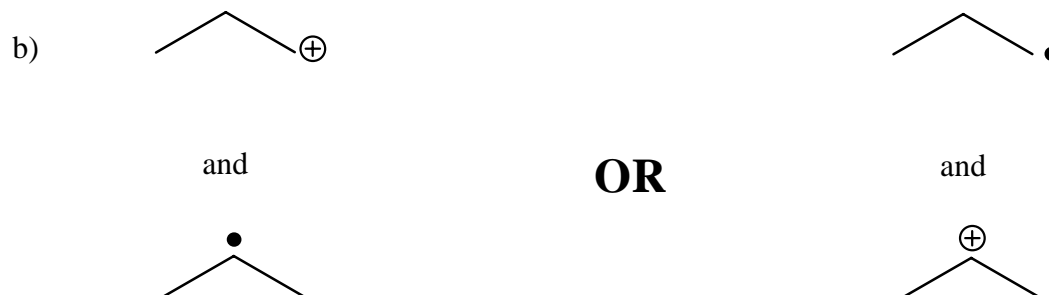
8-14) Indicate which electron is most easily removed (by Electron Ionization) from the following molecules.



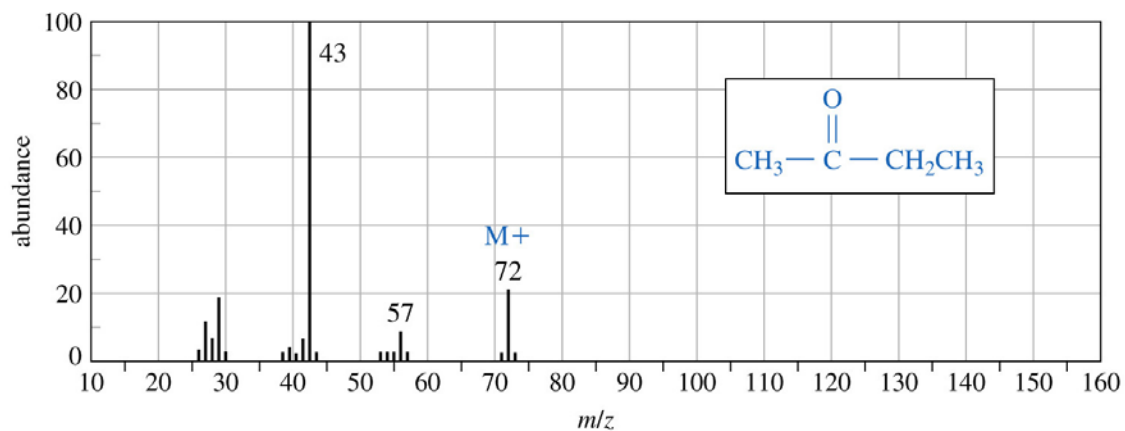
15-17) Draw the curly arrows for the following two reactions.



18-19) Indicate which is the more stable pairing.



20-25) The mass spectrum (EI, positive mode) for 2-butanone is shown below:



i) explain why there are peaks at 72, 57 and 43.

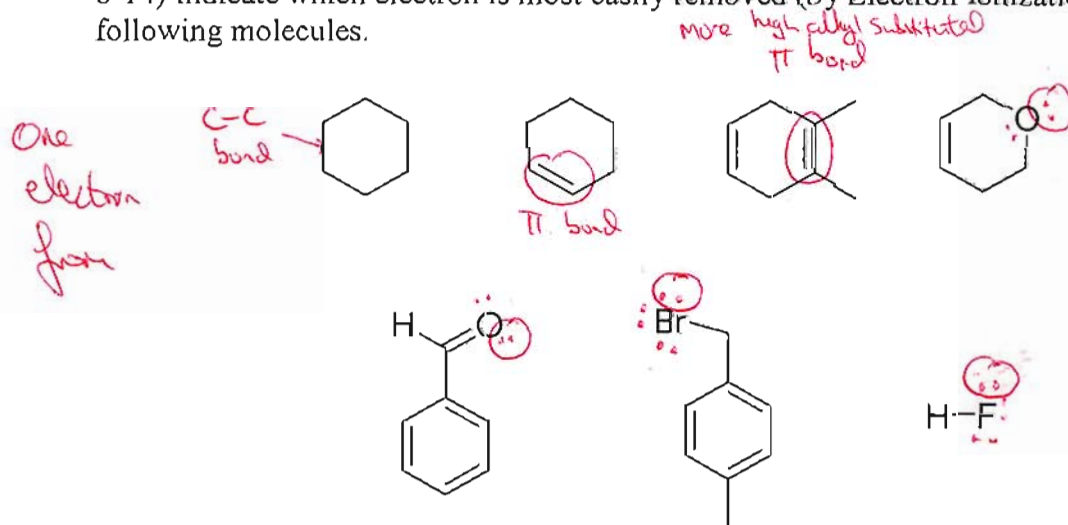
ii) explain why the 43 peak is much larger than the 57 peak.

(recall that atomic weights of C = 12, H = 1 and O = 16)

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M/Z	Mass to charge ratio
APCI	Atmospheric Pressure Chemical Ionization
QQQ	Triple Quadrupole
MALDI	Matrix assisted Laser Desorption Ionization
HPLC	High performance liquid chromatography
GCMS	Gas Chromatography mass Spectrometry
FAB	Fast atom bombardment
ESI	Electro spray Ionization
HRMS	High resolution mass spectrometry
TOF	Time of flight
(MS) <sup>2</sup>	mass spectrometry-mass spectrometry (tandem mass spec.)
AMU	Atomic mass unit

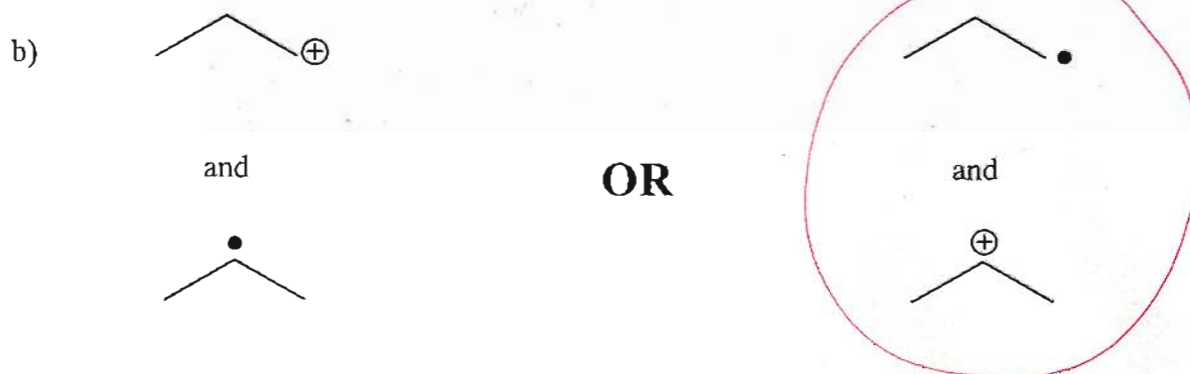
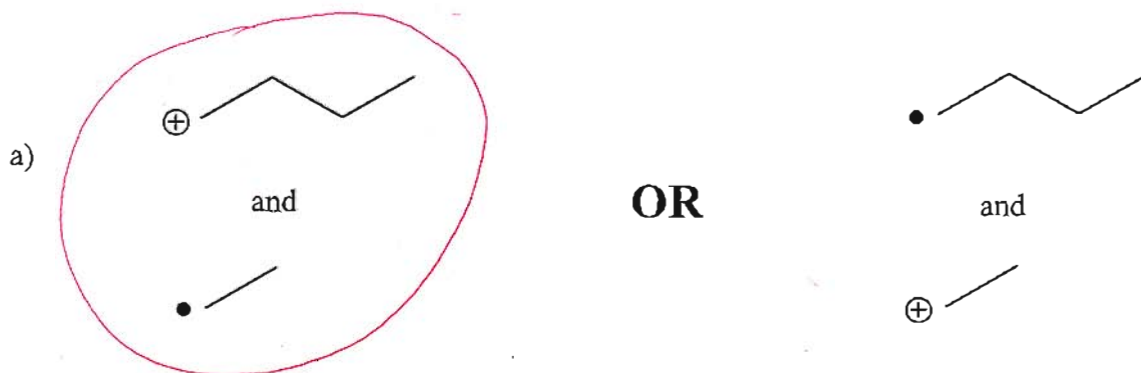
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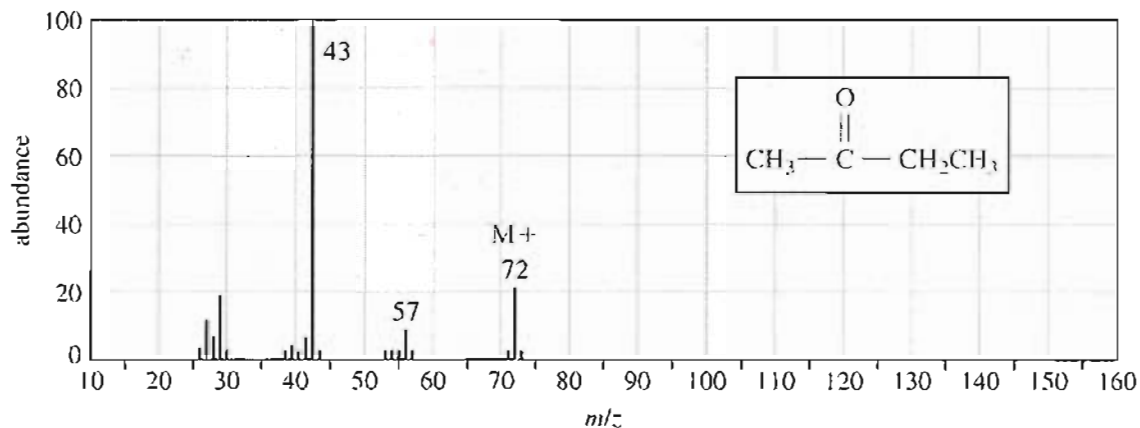
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i) explain why there are peaks at 72, 57 and 43.

ii) explain why the 43 peak is much larger than the 57 peak.

(recall that atomic weights of C = 12, H = 1 and O = 16)



The mass spectrometer identifies the m/z ratio for positively charged species.

(ii) 43 peak is larger than the 57 peak since the pairing of  $\text{CH}_3\text{-C}\equiv\text{O}^+$  &  $\cdot\text{CH}_2\text{CH}_3$  is more stable than  $\text{CH}_3\text{CH}_2\text{C}\equiv\text{O}^+$  &  $\cdot\text{CH}_3$  because the methyl radical is so very unstable.

