[TP] When the color of light is changed from orange to green, ...

13% 1. its frequency is increased
13% 2. its frequency is decreased
13% 3. its wavelength is increased
13% 4. its wavelength is decreased
13% 5. 1 and 3
13% 6. 1 and 4
13% 7. 2 and 3
13% 8. 2 and 4

Response Counter 10

Lecture 6 CH101 A1 (MWF 9:05 am)

Monday, September 18, 2017

For today ...

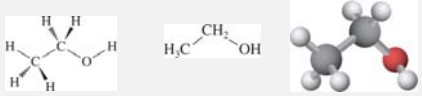
- Molecular mass spectra
- Mass spectra of compounds with Br (or Cl)
- What is light

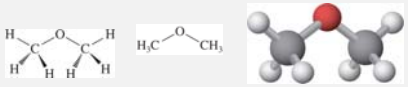
Next lecture: Complete What is light; Jiggling of bonded atoms; Wavelength, frequency, and wavenumber; Infrared (IR) spectra http://quantum.bu.edu/CDF/101/IRFrequency.cdf ;

Memorize: Figs 3.19 (p75) and 3.24 (p 80)
Do not memorize: Table 3.5 (p 78)

Important terms to distinguish

- Constitutional isomers: Ethanol and dimethyl ether
- Empirical formula: C_2H_6O
- Condensed formula: CH_3CH_2OH and CH_3OCH_3
- Structural formula

Ethanol: 

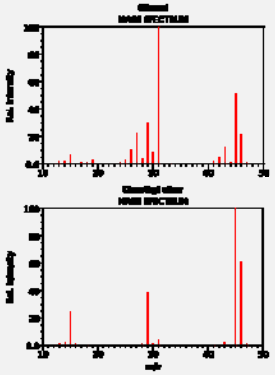
Dimethyl ether: 

[TP] Ethanol, CH_3CH_2OH, and dimethyl ether, CH_3OCH_3, are constitutional isomers. This means that their mass spectra ...

20% 1. must have the same molecular ion peak
20% 2. must contain the same number of peaks at the same places (m/z), but with different heights
20% 3. must contain the same number of peaks but at different places (m/z)
20% 4. 1 and 2
20% 5. 1 and 3

Response Counter 10

Ethanol and dimethyl ether, $C_2H_6O^+$



BOSTON UNIVERSITY

Important isotopes (Table 3.4, p 68)

Element	Isotope	Relative Abundance	Exact Mass	Isotope	Relative Abundance	Exact Mass
carbon	^{12}C	98.90%	12.00000	^{13}C	1.10%	13.00335
oxygen	^{16}O	99.76%	15.99491	^{18}O	0.20%	17.99916
nitrogen	^{14}N	99.63%	14.00307	^{15}N	0.37%	15.00011
hydrogen	^{1}H	99.99%	1.00783	^{2}H	0.01%	2.01410
chlorine	^{35}Cl	75.78%	34.968852	^{37}Cl	24.20%	36.965902
bromine	^{79}Br	50.69%	78.918337	^{81}Br	49.31%	80.916291

C, O, N and H each have a one important isotope

F has one important isotope

Cl has two important isotopes: $^{35}Cl : {}^{37}Cl :: 3:1$

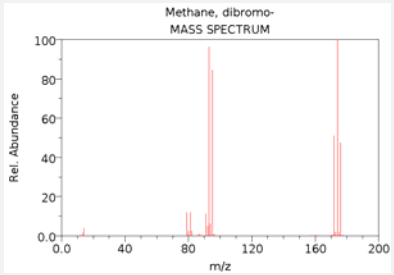
Br has two important isotopes: $^{79}Br : {}^{81}Br :: 1:1$

BOSTON UNIVERSITY

Mass spectra of compounds with Br (or Cl)

BOSTON UNIVERSITY

CH_2Br_2 mass spectrum

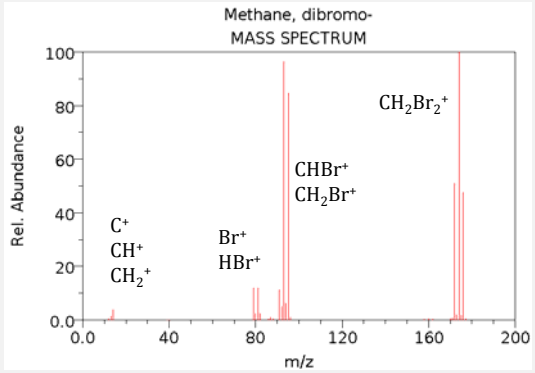


What accounts for each of these singly-charged ion peaks?

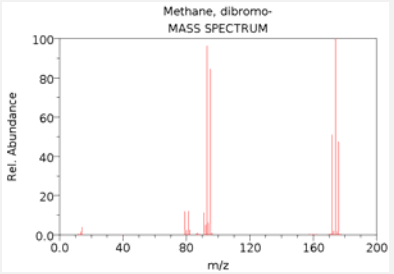
Peaks at largest m/z always due to molecular ion, here $CH_2Br_2^+$

BOSTON UNIVERSITY

CH_2Br_2 mass spectrum



CH_2Br_2 mass spectrum



	^{79}Br ½	^{81}Br ½
^{79}Br ½	½ x ½ = ¼	½ x ½ = ¼
^{81}Br ½	½ x ½ = ¼	½ x ½ = ¼

[TP] Which of
CH_4, CH_3Br, and CH_2Br_2
has the greatest number of molecular ion peaks?

20% 1. CH_4
20% 2. CH_3Br
20% 3. CH_2Br_2
20% 4. CH_3Br and CH_2Br_2
20% 5. They each have the same number of molecular ion peaks

Response Counter 10

What is light?

What is light?

"Light is synchronized oscillating electric and magnetic fields. These fields exert rhythmic tugs on charges in matter, and in this way are able to exchange energy with matter."

BOSTON UNIVERSITY

19