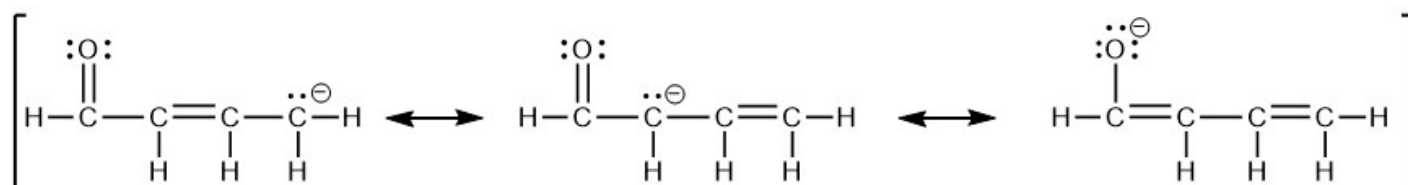
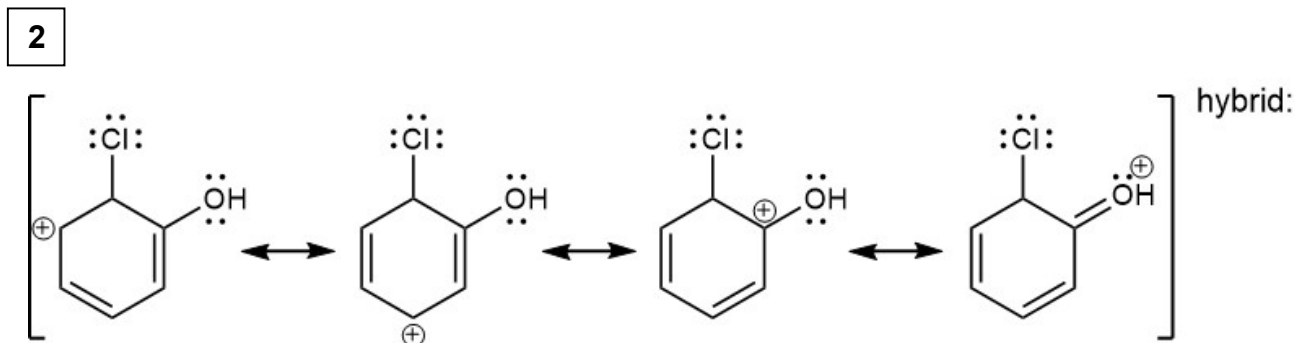




- 1 **Group work:** provide **curved arrows** to convert one resonance structure to the next, **rank** the given resonance forms (e.g., most important, least important, equal contributors, etc.), briefly **explain** the ranking, and draw the **resonance hybrid**.

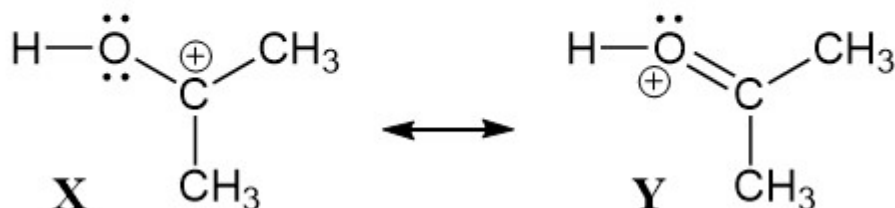


hybrid:

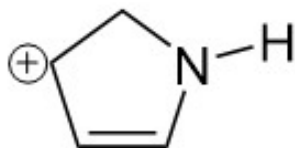


Try SkillBuilders 2.5, 2.6

- 3 Which resonance structure contributes more to the resonance hybrid? Explain briefly.



4 Draw resonance structures for the following cation.

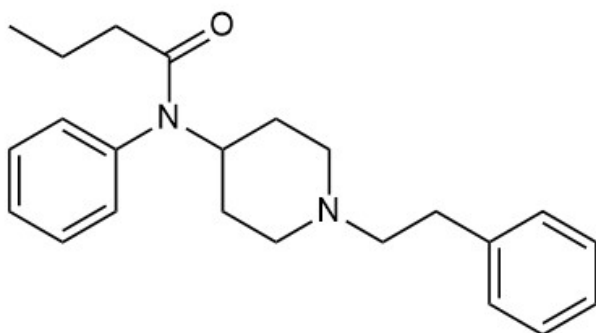


**Hybridization and Resonance: Localized and Delocalized Lone Pairs (Klein 2.13)**

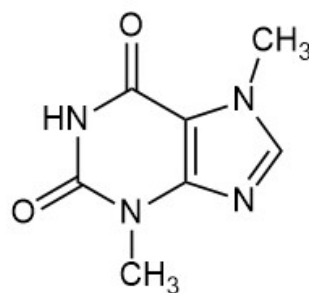
A lone pair that is involved in resonance is described as being \_\_\_\_\_ because it is spread out over multiple atoms.

A \_\_\_\_\_ lone pair is at a single location (not involved in resonance).

**Group work:** Add all missing lone pairs, and identify each as *localized (L)* or *delocalized (D)*.



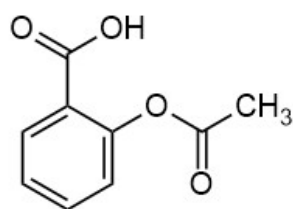
**Fentanyl** - an addictive painkiller. This synthetic opioid is a leading cause of overdose deaths in U.S.



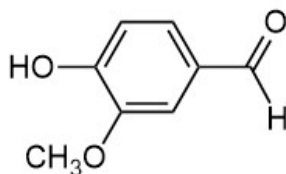
**Theobromine** - makes chocolate toxic to dogs

**Group work:** Use page 2-7 to identify the Functional Groups in fentanyl, aspirin, vanillin & carvone.

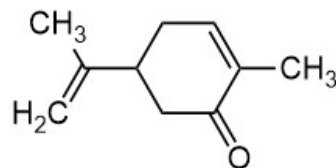
7



**Aspirin** - pain-reliever and fever reducer, a nonsteroidal anti-inflammatory drug (NSAID) that has been on the market since 1899



**Vanillin** - primary component of extracts of vanilla bean, used as artificial flavoring



**Carvone** - smells and tastes like either spearmint or caraway!

### Try SkillBuilder 2.9

Note: "R" represents any carbon group.

	Functional Group	Example	Abbreviation	Name
CHM 3140	alkane	CH <sub>4</sub>	RH	methane
	alkyl halide	CH <sub>3</sub> Cl	RX or RCl	chloromethane (methyl chloride)
	alkene	H <sub>2</sub> C=CH <sub>2</sub>	R <sub>2</sub> CCR <sub>2</sub>	ethene (ethylene)
	alkyne	HC≡CH	RCCR	ethyne (acetylene)
CHM 3150	alcohol	CH <sub>3</sub> OH	ROH	methanol (methyl alcohol)
	ether	CH <sub>3</sub> OCH <sub>3</sub>	ROR or R <sub>2</sub> O	methoxymethane (dimethyl ether)
	amine	CH <sub>3</sub> NH <sub>2</sub>	R <sub>3</sub> N	methanamine (methyl amine)
	aldehyde	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-H	RCHO	ethanal (acetaldehyde)
	ketone	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-CH <sub>3</sub>	RCOR or R <sub>2</sub> CO	2-propanone (acetone)
	carboxylic acid	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-OH	RCO <sub>2</sub> H	ethanoic acid (acetic acid)
	acid chloride (acyl halide)	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-Cl	RCOCl	ethanoyl chloride (acetyl chloride)
	ester	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-OCH <sub>3</sub>	RCO <sub>2</sub> R	methyl ethanoate (methyl acetate)
	amide	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-NH <sub>2</sub>	RCONR <sub>2</sub>	ethanamide (acetamide)
	anhydride	CH <sub>3</sub> - $\overset{\text{O}}{\parallel}$ -C-O-C(=O)-CH <sub>3</sub>	RCO <sub>2</sub> COR or (RCO) <sub>2</sub> O	ethanoic anhydride (acetic anhydride)
	nitrile	CH <sub>3</sub> CN	RCN	ethanenitrile (acetonitrile)
	aromatic		ArH	benzene