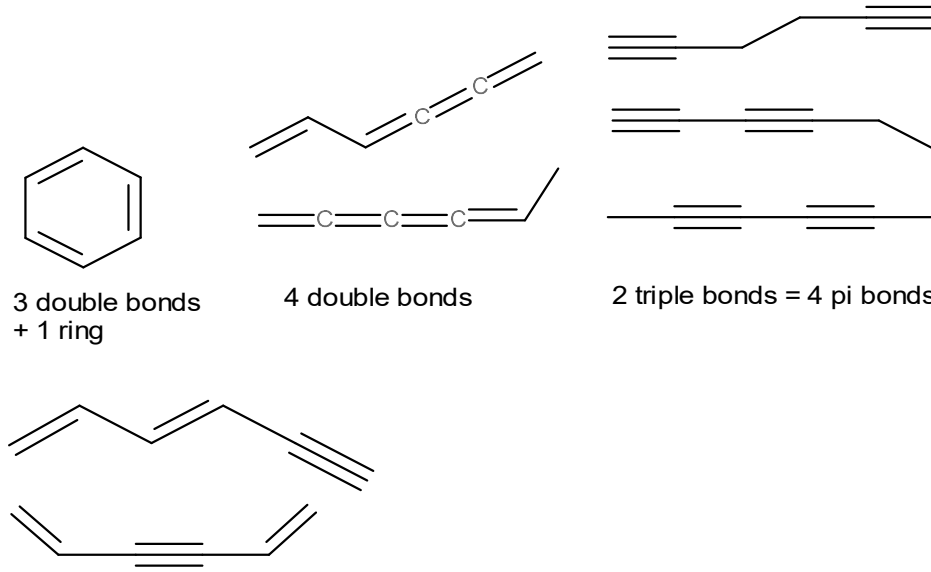
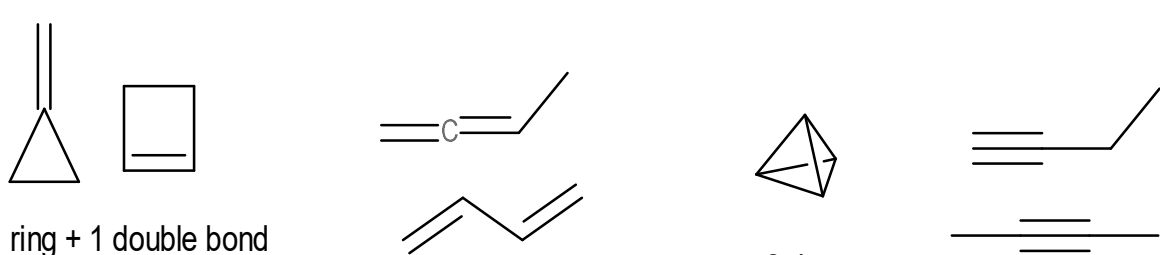
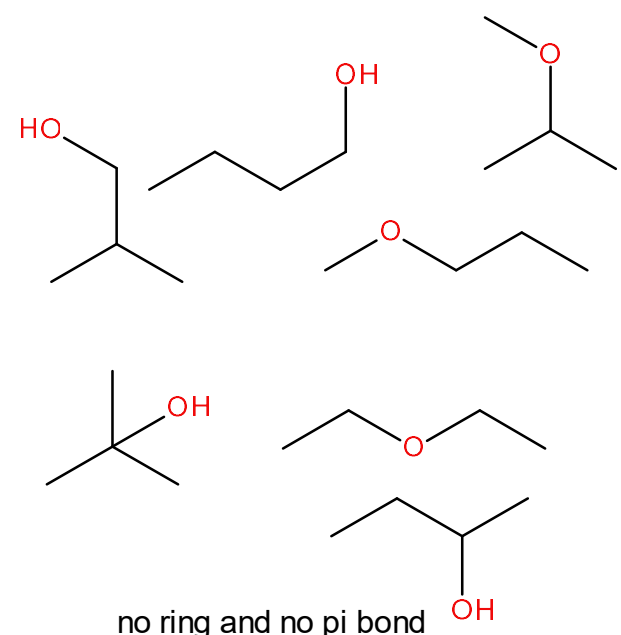
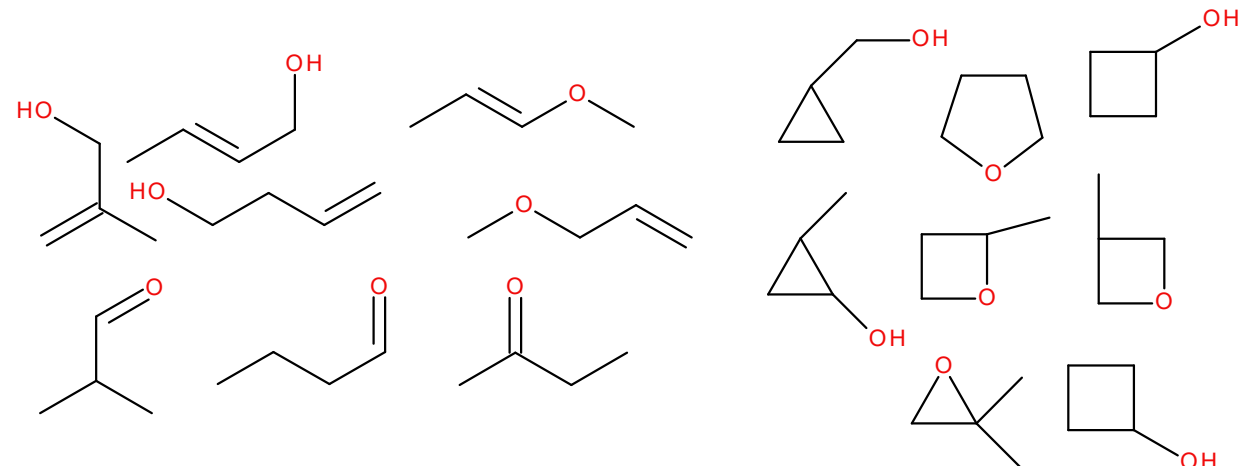
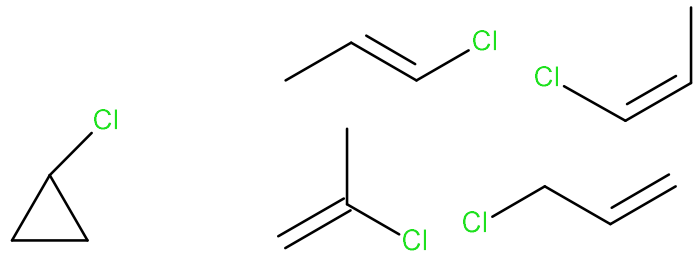
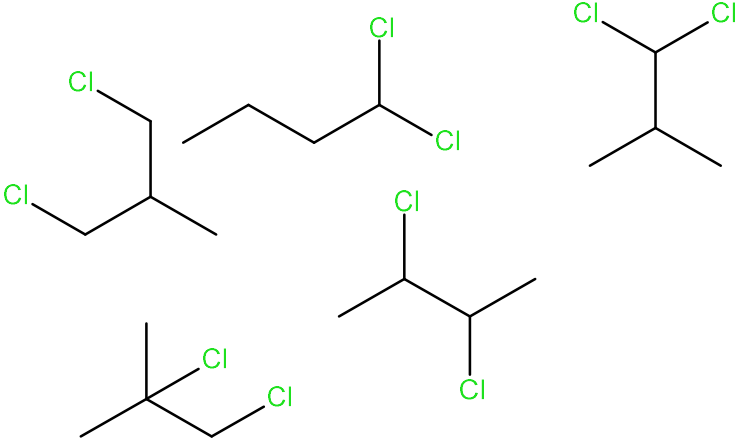


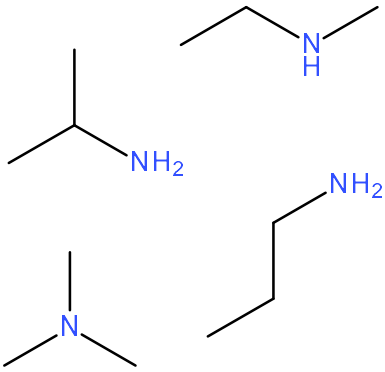
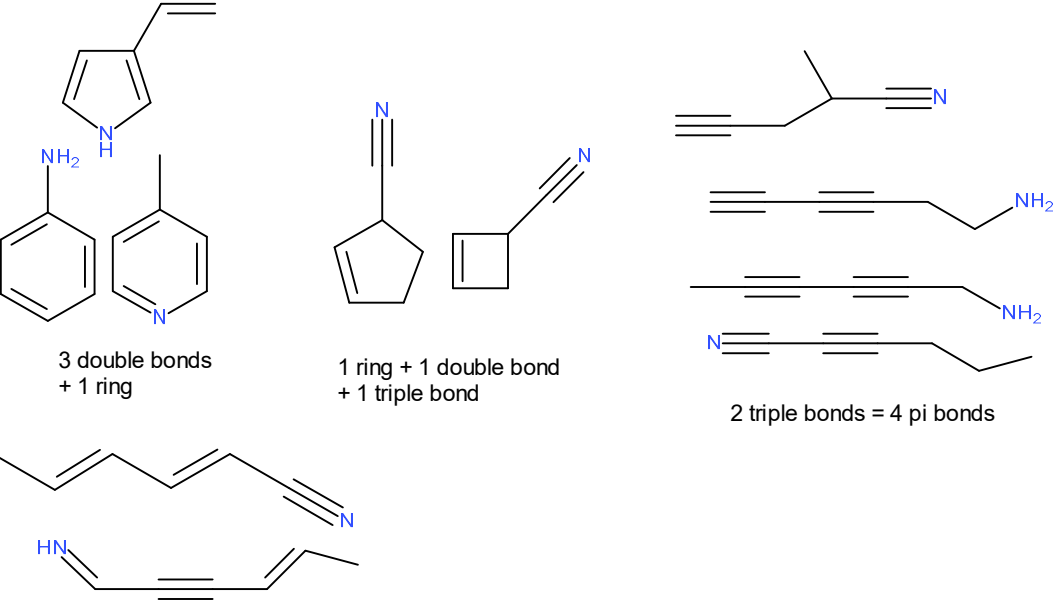
Instructional Planning Template**Title: INDEX of HYDROGEN DEFICIENCY**

Learning Objective	◇ Visually represent simple organic molecules using index of hydrogen deficiency	
Instructional Component	Learning Activity	Feedback / Assessment
Introduction	Review valency of H, F, Cl, Br, I, C, N, O.	Teacher - students
Presentation	<p>Think Pair Share</p> <p>Draw at least 3 structures for the following molecular formula C_6H_6, C_4H_6 $C_4H_{10}O$, C_4H_8O C_3H_5Cl, $C_4H_8Cl_2$ C_3H_9N, C_6H_7N</p> <p>If X is the total number C and Si in M.F., Y total number of N or P in M.F. and Z total number of hydrogen and halogen in M.F. $(2*X + 2 + Y - (Z))/2 = I.H.D.$</p>	Student – student
Practice	<p>Paired Problem Solving</p> <p>Calculate the IHD for your assigned molecular formula Provide an explanation as to why your structures have the calculated IHD.</p>	Student – student Teacher - students
Application	<p>Paired Problem Solving</p> <p>Salbutamol (Ventolin) doping $C_{13}H_{21}NO_3$ Clenbuterol $C_{12}H_{18}Cl_2N_2O$</p> <p>Is it possible that salbutamol or clenbuterol contains a benzene ring and/or a carbonyl ?</p>	Student – student Teacher - students

$\text{C}_6\text{H}_6 \text{ IHD} = \frac{6 \cdot 2 + 2 - 6}{2} = 4$	 <p>3 double bonds + 1 ring</p> <p>4 double bonds</p> <p>2 triple bonds = 4 pi bonds</p> <p>2 double bonds + 1 triple bond = 4 pi bonds</p>
$\text{C}_4\text{H}_6 \text{ IHD} = \frac{4 \cdot 2 + 2 - 6}{2} = 2$	 <p>1 ring + 1 double bond</p> <p>2 double bonds</p> <p>2 rings</p> <p>1 triple bond = 2 pi bonds</p>

$\text{C}_4\text{H}_{10}\text{O IHD} = \frac{4 \cdot 2 + 2 - 10}{2} = 0$	 <p>no ring and no pi bond</p>
$\text{C}_4\text{H}_8\text{O IHD} = \frac{4 \cdot 2 + 2 - 8}{2} = 1$	 <p>1 double bond</p> <p>1 ring</p>

$\frac{C_3H_5Cl \text{ IHD} = 3*2+2-(5+1)}{2} = 1$	 <p>1 ring</p> <p>1 double bond</p>
$\frac{C_4H_8Cl_2 \text{ IHD} = 4*2+2-(8+2)}{2} = 0$	 <p>no ring and no pi bond</p>

$\text{C}_3\text{H}_9\text{N IHD} = \frac{3 \cdot 2 + 2 + 1 - 0}{2} = 0$	 <p>no ring and no pi bond</p>
$\text{C}_6\text{H}_7\text{N IHD} = \frac{6 \cdot 2 + 2 + 1 - 7}{2} = 4$	 <p>3 double bonds + 1 ring</p> <p>1 ring + 1 double bond + 1 triple bond</p> <p>2 triple bonds = 4 pi bonds</p> <p>2 double bonds + 1 triple bond = 4 pi bonds</p>